

PCT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION
(PCT Rule 61.2)

Date of mailing (day/month/year) 26 June 2001 (26.06.01)	To: Commissioner US Department of Commerce United States Patent and Trademark Office, PCT 2011 South Clark Place Room CP2/5C24 Arlington, VA 22202 ETATS-UNIS D'AMERIQUE in its capacity as elected Office
International application No. PCT/EP00/07353	Applicant's or agent's file reference 68/142 PCT
International filing date (day/month/year) 29 July 2000 (29.07.00)	Priority date (day/month/year) 21 September 1999 (21.09.99)
Applicant KNAPP, Alfons	

1. The designated Office is hereby notified of its election made:

in the demand filed with the International Preliminary Examining Authority on:

19 April 2001 (19.04.01)

in a notice effecting later election filed with the International Bureau on:

2. The election was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Olivia TEFY Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To: OPPERMANN, Ewald OPPERMANN & OPPERMANN Am Wiesengrund 35 D-63075 Offenbach ALLEMAGNE	PCT Rec'd 21 MAR 2002 EINGANG 22 JAN. 2002
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**NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

(PCT Rule 71.1)

Applicant's or agent's file reference 68/142 PCT	Date of mailing (day/month/year) 21.01.2002	
IMPORTANT NOTIFICATION		
International application No. PCT/EP00/07353	International filing date (day/month/year) 29/07/2000	Priority date (day/month/year) 21/09/1999
Applicant MASCO CORPORATION OF INDIANA et al.		

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Kellerer, C Tel. +49 89 2399-2261
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PATENT COOPERATION TREATY

PCT

PTO/PCT Rec'd 21 MAR 2002

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 68/142 PCT	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/EP00/07353	International filing date (day/month/year) 29/07/2000	Priority date (day/month/year) 21/09/1999
International Patent Classification (IPC) or national classification and IPC G05D7/01		
<p>Applicant MASCO CORPORATION OF INDIANA et al.</p>		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 12 sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input checked="" type="checkbox"/> Certain defects in the international application VIII <input checked="" type="checkbox"/> Certain observations on the international application 		

Date of submission of the demand 19/04/2001	Date of completion of this report 21.01.2002
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Roberts, N Telephone No. +49 89 2399 2742



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP00/07353

I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):
Description, pages:

1-3,7-14 as originally filed

4,5,6a-6b as received on 28/08/2001 with letter of 24/08/2001

Claims, No.:

1-17 as received on 28/08/2001 with letter of 24/08/2001

Drawings, sheets:

1/4-4/4 as received on 20/12/2001 with letter of 19/12/2001

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP00/07353

the description, pages:
 the claims, Nos.:
 the drawings, sheets:

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-17
	No: Claims
Inventive step (IS)	Yes: Claims 1-17
	No: Claims

**2. Citations and explanations
see separate sheet**

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP00/07353

A - CONCERNING ITEM V

1. The invention concerns an automatic valve intended for installation in the inlet of a thermostatic mixing device.

2. Although originating in a different technical field, the closest prior art is considered to be that disclosed in document US 5 240 036 (D1). Particular attention is drawn to the following parts of D1:
-col. 3, lines 50-57
-col. 4, lines 11-24
-figure 1

3. The valve of claim 1 of the current application differs from the valve of D1 in that, among other things, its cursor comprises means which (when said cursor is in the closed position - ie. when the main valve is closed) permit the passage of a flow rate sufficient only to supply a mixing device with a relatively low fluid demand. In this way the valve protects the connected mixing device from over-pressure when a low-flow apparatus is supplied, but is also able to provide unrestricted flow when a high-flow apparatus is supplied. On the basis of the prior art it is not considered to be obvious to achieve this in this way. For this reason, claim 1 is considered to meet the requirements of Art. 33(3) PCT [Inventive Step].

4. Claims 2-17, by virtue of their dependence on claim 1, are also considered to meet the requirements of Article 33(3) PCT [Inventive Step].

5. All the claims of this application are considered to meet the requirements of Article 33(2) PCT [Novelty] and of Article 33(4) PCT [Industrial Applicability].

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP00/07353

B - CONCERNING ITEM VIII (ART. 6 PCT)

Claim 7 is not clear (Art. 6 PCT), as explained below:

1. Claim 7 states that when the valve is in the first position (ie. closed), the small opening 4 is "up the line" from the seat 2. Looking at figure 1, this appears not to be the case, as the openings 4 are always downstream from the seat 2.
2. Further, claim 7 states that the small opening 4 only becomes pervious when the cursor undergoes a minor shift towards its second (open) position. Looking at figure 1, this also appears not to be the case, as the openings 4 are always open, even when the valve is resting on the seat 2.

C - CONCERNING ITEM VII

1. This report concludes the international procedure. Therefore the observations made therein are intended to assist the Applicants if they should decide to subsequently enter into the national/regional phase. Therefore it is not appropriate to make a response concerning these observations to the International Preliminary Examining Authority.
2. Should the Applicants decide to enter into the national/regional phase, in particular before the European Patent Office, the objections raised under point B above would have to be fully addressed.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:
OPPERMANN & OPPERMANN
Attn. OPPERMANN, Ewald
Am Wiesengrund 35
D-63075 Offenbach
GERMANY

PTO/PCT Rec'd 21 MAR 2002

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
EINGANG OR THE DECLARATION

14. DEZ 2000 (PCT Rule 44.1)

Transferred 14. Feb. 01

Date of mailing
(day/month/year)

14/12/2000

Applicant's or agent's file reference 68/142 PCT	FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. PCT/EP 00/07353	International filing date (day/month/year) 29/07/2000
Applicant MASCO CORPORATION OF INDIANA	

1. The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Fascimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Further action(s): The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority

 European Patent Office, P.B. 5818 Patentlaan 2
 NL-2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Mareike Zambuto

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the International application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/ is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 68/142 PCT	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/EP 00/07353	International filing date (<i>day/month/year</i>) 29/07/2000	(Earliest) Priority Date (<i>day/month/year</i>) 21/09/1999
Applicant MASCO CORPORATION OF INDIANA		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing :
 - contained in the international application in written form.
 - filed together with the international application in computer readable form.
 - furnished subsequently to this Authority in written form.
 - furnished subsequently to this Authority in computer readable form.
 - the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
 - the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished
- 2. Certain claims were found unsearchable (See Box I).
- 3. Unity of invention is lacking (see Box II).
- 4. With regard to the title,
 - the text is approved as submitted by the applicant.
 - the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- the text is approved as submitted by the applicant.
- the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

- as suggested by the applicant.
- because the applicant failed to suggest a figure.
- because this figure better characterizes the invention.

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None of the figures.

INTERNATIONAL SEARCH REPORT

ational application No.
PCT/EP 00/07353

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

PLEASE DELETE from page 13 "The spring..." till page 21:
"absorption".

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 00/07353

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G05D7/01 F16K15/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G05D F16K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 872 908 C (RICHARD SIMON) 14 August 1952 (1952-08-14)	1,3,5,6
Y	claims 2,3	4,7, 14-17
A	figure 3 ---	2,8-13
Y	DE 89 06 400 U (ROBERT BOSCH GMBH) 20 September 1990 (1990-09-20)	4
A	the whole document ---	1-3,5-17
Y	WO 99 46652 A (FLOW DESIGN INC) 16 September 1999 (1999-09-16)	7
A	figure 3 ---	1-6,8-17
Y	GB 2 270 139 A (HAUDIQUER IND S A ;DOUGLAS IND SALES LIMITED (GB)) 2 March 1994 (1994-03-02)	14-17
A	the whole document ---	1-13
		-/-

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

5 December 2000

14/12/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.
Fax (+31-70) 340-3016

Authorized officer

Philippot, B

INTERNATIONAL SEARCH REPORT

International Application No

EP 00/07353

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 762 433 A (MOORE R) 2 October 1973 (1973-10-02) column 2, line 30 – line 34 column 3, paragraph 3 figures 1,2 ---	1,5,6,8, 9 10 2-4,7, 11-17
X	US 5 240 036 A (MORRIS BRIAN G) 31 August 1993 (1993-08-31) the whole document ---	1-3,8,11
Y		10
A		4-7,9, 12-17
A	US 5 117 860 A (HORNER JR CHARLES B) 2 June 1992 (1992-06-02) the whole document ---	1-11

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 00/07353

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
DE 872908	C	NONE		
DE 8906400	U	20-09-1990		NONE
WO 9946652	A	16-09-1999	AU 3075699 A	27-09-1999
GB 2270139	A	02-03-1994		NONE
US 3762433	A	02-10-1973	CA 974852 A DE 2334634 A JP 49064032 A	23-09-1975 07-02-1974 21-06-1974
US 5240036	A	31-08-1993	NONE	
US 5117860	A	02-06-1992	CA 2120238 A DE 69204684 D DE 69204684 T EP 0608324 A JP 7500297 T MX 9206015 A WO 9308059 A	29-04-1993 12-10-1995 08-02-1996 03-08-1994 12-01-1995 01-04-1993 29-04-1993

NVL

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PATENT COOPERATION TREATY

PCT

REC'D 24 JAN 2002

INTERNATIONAL PRELIMINARY EXAMINATION REPORT PCT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 68/142 PCT	FOR FURTHER ACTION		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/EP00/07353	International filing date (day/month/year) 29/07/2000	Priority date (day/month/year) 21/09/1999	
International Patent Classification (IPC) or national classification and IPC G05D7/01			
Applicant MASCO CORPORATION OF INDIANA et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 12 sheets.

3. This report contains indications relating to the following items:

- I Basis of the report
- II Priority
- III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

Date of submission of the demand 19/04/2001	Date of completion of this report 21.01.2002
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Roberts, N Telephone No. +49 89 2399 2742



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP00/07353

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):
Description, pages:

1-3,7-14 as originally filed

4,5,6a-6b as received on 28/08/2001 with letter of 24/08/2001

Claims, No.:

1-17 as received on 28/08/2001 with letter of 24/08/2001

Drawings, sheets:

1/4-4/4 as received on 20/12/2001 with letter of 19/12/2001

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP00/07353

the description, pages:
 the claims, Nos.:
 the drawings, sheets:

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1-17
	No:	Claims
Inventive step (IS)	Yes:	Claims 1-17
	No:	Claims

Industrial applicability (IA) Yes: Claims 1-17
 No: Claims

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

A - CONCERNING ITEM V

1. The invention concerns an automatic valve intended for installation in the inlet of a thermostatic mixing device.

2. Although originating in a different technical field, the closest prior art is considered to be that disclosed in document US 5 240 036 (D1). Particular attention is drawn to the following parts of D1:
-col. 3, lines 50-57
-col. 4, lines 11-24
-figure 1

3. The valve of claim 1 of the current application differs from the valve of D1 in that, among other things, its cursor comprises means which (when said cursor is in the closed position - ie. when the main valve is closed) permit the passage of a flow rate sufficient only to supply a mixing device with a relatively low fluid demand. In this way the valve protects the connected mixing device from over-pressure when a low-flow apparatus is supplied, but is also able to provide unrestricted flow when a high-flow apparatus is supplied. On the basis of the prior art it is not considered to be obvious to achieve this in this way. For this reason, claim 1 is considered to meet the requirements of Art. 33(3) PCT [Inventive Step].

4. Claims 2-17, by virtue of their dependence on claim 1, are also considered to meet the requirements of Article 33(3) PCT [Inventive Step].

5. All the claims of this application are considered to meet the requirements of Article 33(2) PCT [Novelty] and of Article 33(4) PCT [Industrial Applicability].

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP00/07353

B - CONCERNING ITEM VIII (ART. 6 PCT)

Claim 7 is not clear (Art. 6 PCT), as explained below:

1. Claim 7 states that when the valve is in the first position (ie. closed), the small opening 4 is "up the line" from the seat 2. Looking at figure 1, this appears not to be the case, as the openings 4 are always downstream from the seat 2.
2. Further, claim 7 states that the small opening 4 only becomes pervious when the cursor undergoes a minor shift towards its second (open) position. Looking at figure 1, this also appears not to be the case, as the openings 4 are always open, even when the valve is resting on the seat 2.

C - CONCERNING ITEM VII

1. This report concludes the international procedure. Therefore the observations made therein are intended to assist the Applicants if they should decide to subsequently enter into the national/regional phase. Therefore it is not appropriate to make a response concerning these observations to the International Preliminary Examining Authority.
2. Should the Applicants decide to enter into the national/regional phase, in particular before the European Patent Office, the objections raised under point B above would have to be fully addressed.

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thermostatic mixing faucet is capable of and, under these conditions, any possible, even significant, pressure differences between the water supply pipelines will not cause any inconvenience.

5

This provision ensures the perfect operation of a thermostatic mixing faucet, but it requires a maneuver, albeit a simple one, on the part of the user, and, furthermore, it cannot be applied to thermostatic mixing devices at whose inlet thin blocking plates are not installed.

In view of this, the primary purpose of this invention is to provide a valve intended to be installed at the inlet of a thermostatic mixing device of any kind, which would be suitable for automatically bringing about a performance in accordance with the one that is caused by the above-mentioned provision, causing a partial division of the passage cross-section, while the thermostatic mixing device supplies an apparatus with low water flow demand, which offers high resistance against the flow and, on the other hand, leaving the water supply line substantially clear, while the thermostatic mixing device supplies one or several apparatuses with a high overall water flow demand, which, together, gives rise to a low resistance against the flow.

25

Another object of the invention is to provide such an automatic valve, which would furthermore combine the function of a nonreturn valve as is required in many cases in which it is installed.

30.

Yet another object of the invention is to provide such a valve, which would have a simple structure, be easy to

AMENDED SHEET

28-08-2001

- 5 -

manufacture, relatively cheap and so designed as to facilitate maintenance.

SUMMARY OF THE DISCLOSURE

5

The first object of the invention is achieved in a valve intended for installation in the inlet of a thermostatic mixing device by virtue of the fact that the valve comprises a tubular body intended to be inserted in or constitute part of 10 a pipe or connection for water supply, said body having a holding seat; a cursor that can be moved in said body with respect to said seat between a first position in which it at least partly occludes said seat, and a second position in which it leaves said seat substantially clear to permit the 15 passage of a relatively large flow rate, said cursor being subjected, on the one hand, to the pressure of the water supply pipeline and, on the other hand, to the pressure existing inside said mixing device; and a spring that works on said cursor, pushing it toward said first position, said 20 spring being dimensioned so that said cursor, with respect to said seat, will assume said first position or a position close to it under conditions in which the water flow demanded by said mixing device is relatively low, and will be shifted toward said second position or until it reaches it under 25 conditions in which the water flow demanded by said mixing device is relatively high; wherein said cursor comprises means which, when said cursor assumes said first position or a position close to it, permit the passage of a flow rate sufficient only to supply a mixing device with a relatively 30 low water flow demand.

In this way, when the water supply of an apparatus with low

- 6a -

water flow demand tends to cause inside the thermostatic mixing device the establishment of a pressure close to the water supply pressure, the small difference between these pressures causes the cursor to assume a position close to said 5 first position or coinciding with it and leaving clear a small passage cross-section, thus causing a pressure drop because of which the pressure that is actually established inside the thermostatic mixing device is limited and cannot give rise to any instability. When, on the other hand, the supply to 10 apparatuses having a high overall water flow demand is such that inside the thermostatic mixing device a very low pressure develops, then the cursor, pushed by a greater pressure difference, assumes a position close to the second position while coinciding with it, leaving clear a large passage cross- 15 section, thus not causing a pressure drop that would appreciably reduce the volume of water drawn, whereas, on the other hand, under these conditions, the thermostatic mixing device does not tend to display any unstable performance. The valve thus automatically -- and independently of the kind of 20 thermostatic mixing device involved -- brings about the same effect that can be achieved by an appropriate maneuver employed by the user according to the teaching in Italian Patent Application TO 99 A 000 455.

REPLACEMENT SHEET

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- 6b-

~~position or coinciding with it and leaving clear a small passage cross-section, thus causing a pressure drop because of which the pressure that is actually established inside the thermostatic mixing device is limited and cannot give rise to any instability. When, on the other hand, the supply to apparatuses having a high overall absorption is such that inside the thermostatic mixing device a very low pressure develops, then the cursor, pushed by a greater pressure difference, assumes a position close to the second position while coinciding with it, leaving clear a large passage cross-section, thus not causing a pressure drop that would appreciably reduce the volume of water drawn, whereas, on the other hand, under these conditions, the thermostatic mixing device does not tend to display any unstable performance. The valve thus automatically -- and independently of the kind of thermostatic mixing device involved -- brings about the same effect that can be achieved by an appropriate maneuver employed by the user according to the teaching in Italian Patent Application TO 99 A 000 455.~~

20

An automatic valve, according to the invention, can be inserted in only one water supply pipeline or in both, but preferably it is inserted only in the cold water supply pipeline.

25

The second object of the invention is achieved when the cursor in said first position occludes the seat totally. In this case, as a matter of fact, when no water is drawn or if the flow tends to assume a direction opposite to the normal direction, the cursor, shifting into said first position, completely occludes said seat so that the valve works like a nonreturn valve.

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CLAIMS:

1. An automatic valve intended for installation in the inlet of a thermostatic mixing device, comprising:

5 a tubular body (1) intended to be inserted in or constitute part of a pipe or connection for water supply, said body (1) having a holding seat (2);

10 a cursor (3) that can be moved in said body (1) with respect to said seat (2) between a first position in which it at least partly occludes said seat (2), and a second position in which it leaves said seat (2) substantially clear to permit the passage of a relatively large flow rate, said cursor (3) being subjected, on the one hand, to the pressure of the water supply pipeline and, on the other hand, to the pressure 15 existing inside said mixing device; and

a spring (6) that works on said cursor (3), pushing it toward said first position, said spring (6) being dimensioned so that said cursor (3), with respect to said seat (2),

20 will assume said first position or a position close to it under conditions in which the water flow demanded by said mixing device is relatively low, and

will be shifted toward said second position or until it reaches it under conditions in which the water flow demanded by said mixing device is relatively high;

25 wherein said cursor (3) comprises means (4, 5', 9) which, when said cursor (3) assumes said first position or a position close to it, permit the passage of a flow rate sufficient only to supply a mixing device with a relatively low water flow demand.

30

2. Automatic valve according to Claim 1, wherein said cursor (3) in said first position totally occludes said seat (2) so

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that the valve will also work as a nonreturn valve.

3. Automatic valve according to Claim 1, wherein an element (7) intended to act as nonreturn valve is inserted in it.

5

4. Automatic valve according to Claim 3, wherein said element (7), functioning as a nonreturn valve, consists of a flexible and elastic membrane, arranged so as to occlude at least one passage opening (4), while the flow tends to assume 10 a direction opposite to the normal direction.

10

5. Automatic valve according to one of Claims 1 to 4, wherein said cursor (3) has at least one opening (4) with small dimensions, intended to permit the passage of a flow 15 rate sufficient only to supply a mixing device with a relatively low water flow demand.

15

6. Automatic valve according to Claim 5, wherein at least one opening (4) with small dimensions is permanently pervious.

20

7. Automatic valve according to Claim 5, wherein said opening (4) with small dimensions is situated up the line from said seat (2) when said cursor (3) assumes said first position, and becomes pervious only when said cursor (3) 25 undergoes a minor shift toward its second position.

25

8. Automatic valve according to one of Claims 1 to 4, wherein said cursor (3) comprises openings (5) with large dimensions which are situated up the line from said seat (2) 30 when said cursor (3) assumes said first position or a position close to it, and which become pervious when said cursor (3) shifts toward its second position or reaches it.

AMENDED SHEET

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9. Automatic valve according to Claim 8, wherein said openings (5') with large dimensions have a tapered form so as to become pervious in an increasing manner, along with the 5 increase in the shift of said cursor (3) from said first position to said second position.

10. Automatic valve according to Claim 9, wherein said openings (5') with the tapered shape are situated entirely up 10 the line from said seat (2) when said cursor (3) assumes said first position so that the valve will also work as a nonreturn valve.

11. Automatic valve according to one of Claims 1 to 10, 15 wherein said cursor (3) has a holding packing (8), acting in said first position with respect to said seat (2), and whose removal, when said cursor (3) is shifted toward said second position, clears wide passage cross-sections.

20 12. Automatic valve according to one of Claims 1 to 4, wherein a known flow rate regulator (9) is mounted in said cursor (3), whose substantially constant flow rate is adapted to the anticipated supply flow rate of a mixing device with a relatively low water flow demand.

25 13. Automatic valve according to Claim 12, wherein said flow rate regulator (9) is of a type provided with means that act as nonreturn valve.

30 14. Automatic valve according to one of the preceding claims, which is installed in both water supply pipelines of a thermostatic mixing device.

AMENDED SHEET

- 18 -

15. Automatic valve according to one of Claims 1 to 13, which is installed in only one of the water supply pipelines of a thermostatic mixing device.

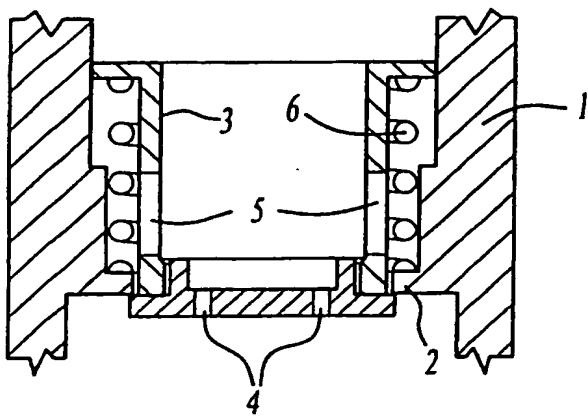
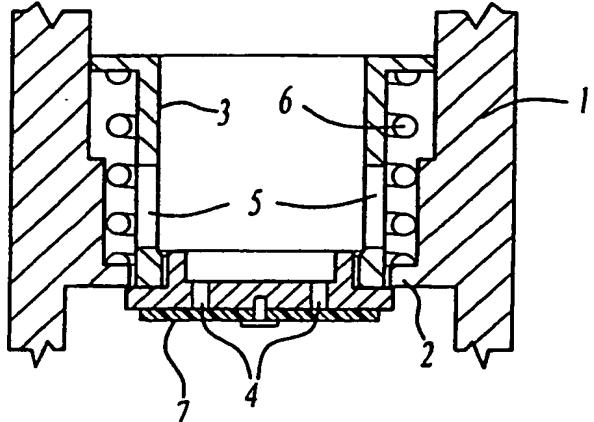
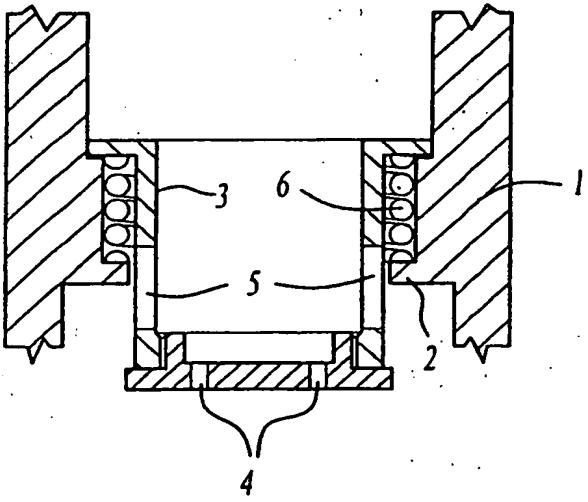
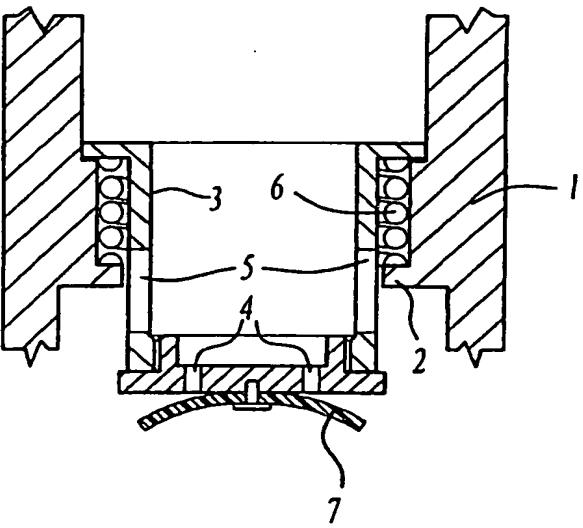
5

16. Automatic valve according to Claim 15, which is installed in the cold water supply pipeline going to a thermostatic mixing device.

10 17. Thermostatic mixing device which is provided with at least one automatic stabilization valve according to one or several of the preceding claims.

AMENDED SHEET

1/4

Fig-1Fig-3Fig-2Fig-4

2/4

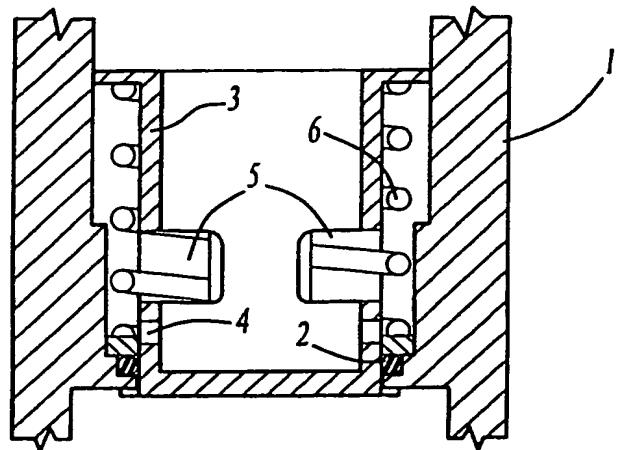


Fig-5

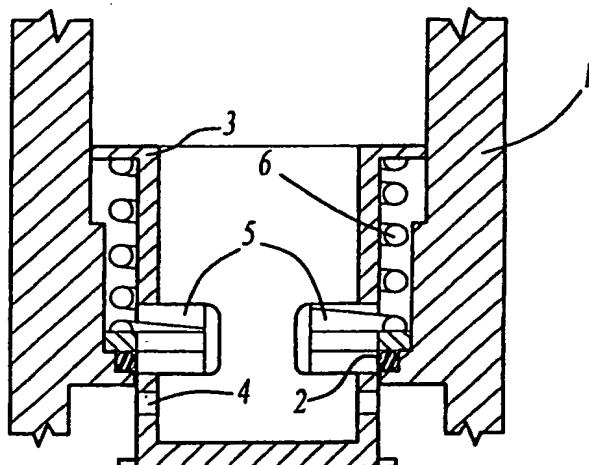


Fig-6

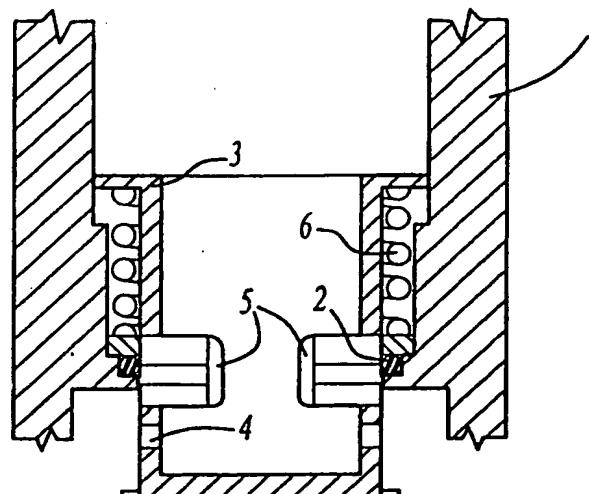


Fig-7

3/4

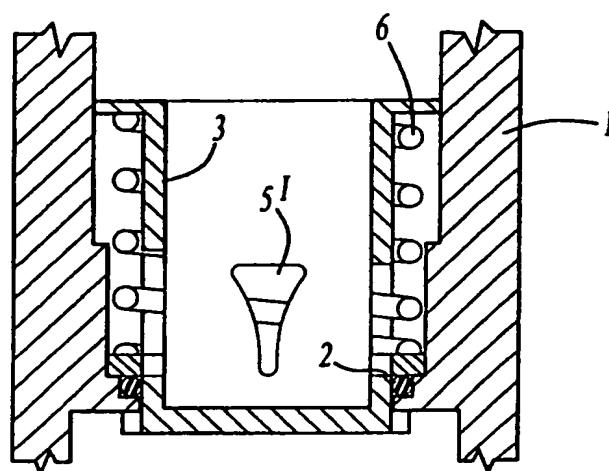


Fig-8

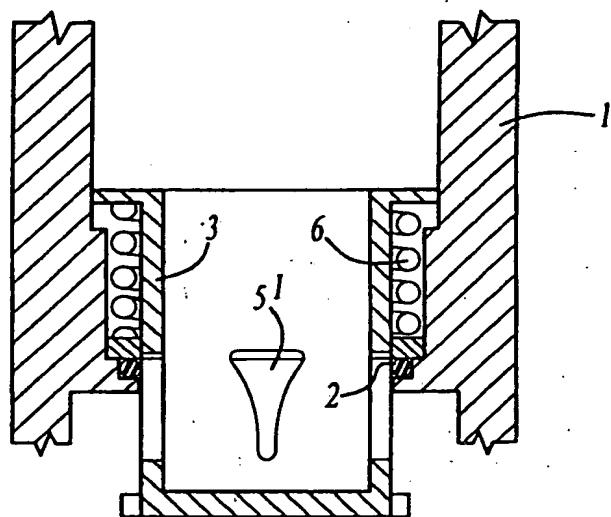
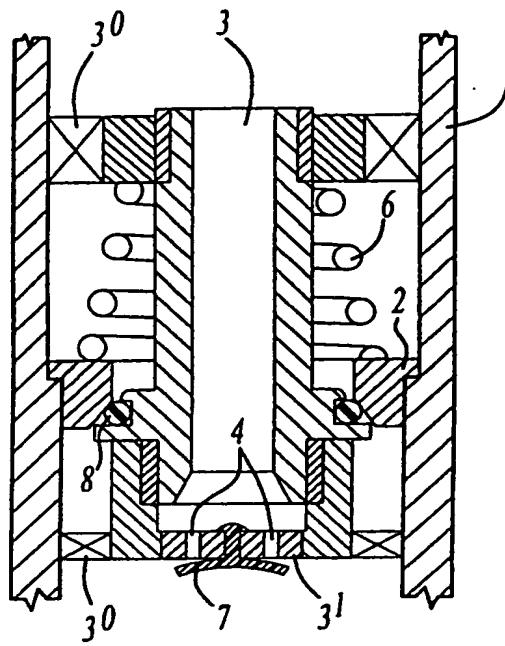
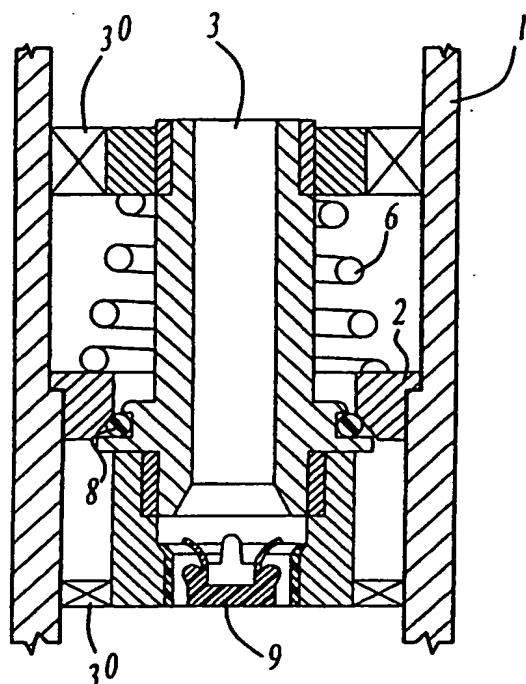
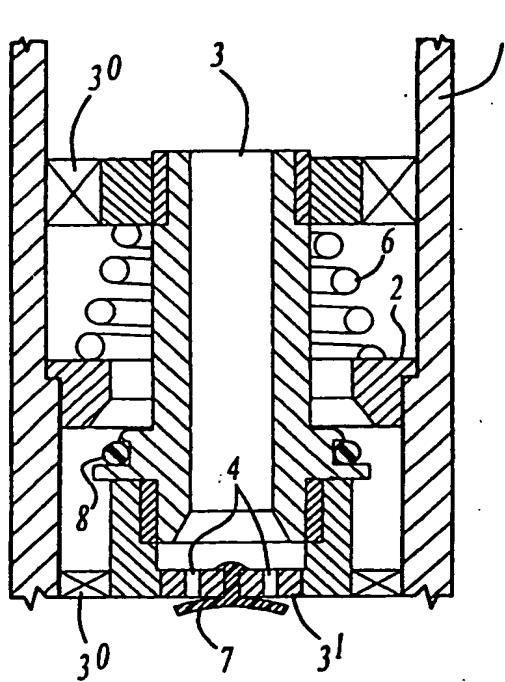
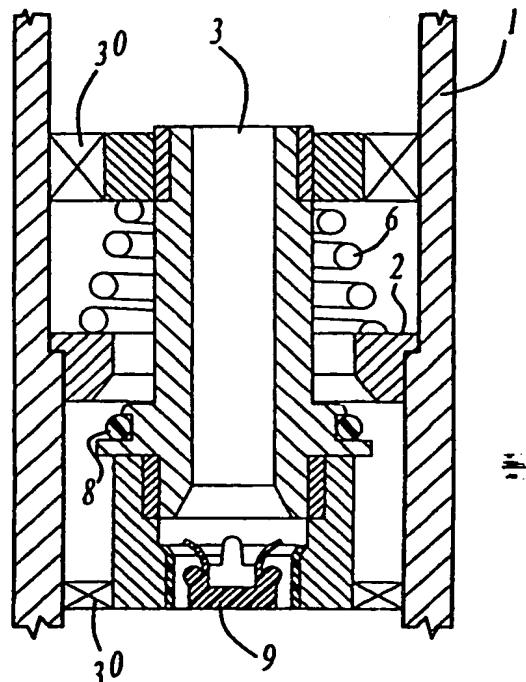


Fig-9

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Fig-10Fig-12Fig-11Fig-13

PATENT COOPERATION TREATY

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

OPPERMANN, Ewald
OPPERMANN & OPPERMANN
Am Wiesengrund 35
D-63075 Offenbach
ALLEMAGNE

PTO/PCT Rec'd 21 MAR 2002



PCT

WRITTEN OPINION
(PCT Rule 66)

		Date of mailing (day/month/year) 25.05.2001	
Applicant's or agent's file reference 68/142 PCT		REPLY DUE	within 3 month(s) from the above date of mailing
International application No. PCT/EP00/07353	International filing date (day/month/year) 29/07/2000	Priority date (day/month/year) 21/09/1999	
International Patent Classification (IPC) or both national classification and IPC G05D7/01			
Applicant MASCO CORPORATION OF INDIANA et al.			

1. This written opinion is the first drawn up by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:
 - I Basis of the opinion
 - II Priority
 - III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV Lack of unity of invention
 - V Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI Certain document cited
 - VII Certain defects in the international application
 - VIII Certain observations on the international application
3. The applicant is hereby invited to reply to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4. For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis. For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.
4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: **21/01/2002**.

Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer / Examiner Roberts, N
Formalities officer (incl. extension of time limits) Kellerer, C Telephone No. +49 89 2399 2261	



I. Basis of the opinion

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"*):

Description, pages:

1-14 as originally filed

Claims, No.:

1-17 as originally filed

Drawings, sheets:

1/3-3/3 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, . . . pages:
- the claims, Nos.:

WRITTEN OPINION

International application No. PCT/EP00/07353

the drawings, sheets:

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c));
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims
Inventive step (IS)	Claims 1-6, 9-17
Industrial applicability (IA)	Claims

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

A - CONCERNING ITEM VIII

The claims are not clear (Art 6 PCT), as explained below:

1. An independent claim should contain all the features essential to achieve the object of the invention [see the description, page 4, lines 12-24]. In this regard it is considered that the following aspects represents essential features which should be included in claim 1:
 - a) The specific construction of the cursor, including the fact that the upper-part (3), the openings (5) and the part which contains the small openings (4) are all part of the said cursor.
 - b) The fact that the small openings (4) in the said cursor permit the passage of a flow rate sufficient only to supply a device with a low water flow demand [see claim 5].
2. Without the inclusion of these features, the claimed invention (as defined by claim 1) does define all the features necessary to enable the claimed valve to automatically provide a restricted flow-path when supplying a device with a low flow demand and a relatively free flow-path when supplying a device with a high flow demand.
3. The last part of claim 1 (from the words "so that" on line 15 to the end of the claim) are not clear because they claim by desired result, instead of specifying concrete technical features which define how this result to be achieved. It is not obvious to a skilled person how this desired result should be achieved. It should however be noted that when the objections raised under points A1 and A2 above have been fully addressed, this objection should also be negated.
4. In line 7 of claim 1 the term "presented by said body" is not clear. A possible alternative could be to define the seat as being "integral to said body".

5. The terms "under conditions involved in the water supply of an apparatus that has a low degree of absorption" [claim 1, lines 17-19] and "under conditions involved in the water supply of apparatuses featuring a total high absorption" [claim 1, lines 21-22] are not clear. It is suggested that these terms be replaced, respectively by the following:
 - a) "under conditions in which the water flow demanded by said mixing device is relatively low"
 - b) "under conditions in which the water flow demanded by said mixing device is relatively high."
6. Corresponding amendment should also be made to claim 5.
7. Claims 7, 8 and 10 refer to "the first position". This is not clear because it appears to be a different meaning of the expression "first position" to that previously defined in claim 1 [page 15, line 8].

B - CONCERNING ITEM V

1. The following documents are cited:
D1: US 5 240 036
D2: DE 89 06 400 U
D3: WO 99/46652
D4: GB 2 270 139

2. D1 is considered to represent the closest prior art. Particular attention is drawn to the following parts of D1:
 - col. 3, lines 50-57
 - col. 4, lines 11-24
 - figure 1
3. It is considered of particular relevance that the device of D1 has by-pass holes (36) in its cursor (14), and that a small amount of fluid can flow through these by-pass-holes (36) from the inlet (12) to the outlet (13) even when the cursor (14) is closed onto the main valve seat (47). Thus, if connected to a mixing device (in the same way as the present invention), the valve of D1 would behave in the same way as the present invention: Namely, when the mixing device demands only a small flow, the cursor (14) of D1 would remain on the seat (47), and when the mixing device demands a large flow, the spring (28) would be compressed, and the cursor (14) would move from the seat (47) in order to open the main valve for flow.
4. Claim 1 of the present application may therefore be read onto figure 1 of D1, as shown under point B(5) below. In this "read-on comparison", the reference signs of figure 1 of D1 have been superimposed onto the text of claim 1 of the present application.
5. A valve [omission] characterized in that it comprises a tubular body (10, 40) intended to be inserted in or constitute part of a pipe or connection for water [fluid] supply, a holding seat (47) presented by said body (40), a cursor (14) that can be moved in said body (10, 40) with respect to said seat (47) between a first position [main valve 14/47 closed] in which it at least partly occludes said seat (47) and a second position [main valve 14/47 open] in which it leaves said seat (47) substantially clear, said cursor (14) being subjected, on the one hand, to the pressure of the water [fluid] supply pipeline [pressure coming from inlet port (12)] and, on the other hand, to the pressure existing inside the thermostatic mixing device [pressure coming from any such device connected to outlet port (13)], and a spring (28) that works on said cursor (14), pushing it

toward the occlusion position [main valve 14/47 closed], said spring (28) being dimensioned so that the cursor (14), with respect to the seat (47), will assume a position that brings about a reduced passage cross-section [main valve 14/47 closed] under conditions involved in the water supply of an apparatus that has a low degree of absorption [see comment in section B(3) above] and in which, with respect to the seat, it assumes a position causing a large passage cross-section under conditions involved in the water supply of apparatuses featuring a total high absorption [see comment in section B(3) above].

6. From this comparison it may be seen that D1 discloses all the salient features of claim 1. Therefore claim 1 fails to meet the requirements of Art. 33(3) PCT [Inventive Step].
7. Claim 4 is not considered to contain an inventive step on the basis of D2.
8. Claims 5 and 6 are not considered to contain an inventive step on the basis of D1 (figure 1).
9. Claim 7 (when taken in combination with the claims on which it is dependent) appears to contain features which are not rendered obvious by the prior art. These features could therefore form the basis of an inventive claim 1. However, the clarity objections raised in section A would have to be fully addressed. Furthermore, the expression "in the first position up the line from said seat" which is used in claim 7 would have to be clarified [also see section A(7) above] and the term "at least" [page 16 (line 17)] deleted.
10. Claim 8 (when taken in combination with the claims on which it is dependent) appears to contain features which are not rendered obvious by the prior art. These features could therefore form the basis of an inventive claim 1. However, the clarity objections raised in section A would have to be fully addressed.

Furthermore, the expression "in the first position or in a position close to it up the line from said seat" which is used in claim 8 would have to be clarified [also see section A(7) above]. Also, it would have to be made clear that the large openings defined (in claim 8) correspond to the opening flow path when the main valve of the invention opens.

11. Claim 9 is not considered to contain an inventive step on the basis of D3 (figure 3).
12. Claims 2-3 and 10-17 do not appear to introduce subject-matter which could form the basis of an inventive independent claim because they define features which either constitute part of the common general knowledge or which are derivable in an obvious way from the prior art.

C - CONCERNING ITEM VII

1. D1 should be identified in the description and the relevant material disclosed therein should be briefly discussed. This is necessary in order to set out more fully the background art useful for understanding the invention, as required by Rule 5.1(a)(ii) PCT.
2. Reference signs in parentheses should be inserted in the claims to increase their intelligibility, Rule 6.2(b) PCT.

**WRITTEN OPINION
SEPARATE SHEET**

International application No. PCT/EP00/07353

3. The description, particularly the summary of invention in the introductory portion, should be amended in order to bring it into conformity with the new independent claim 1, Rule 5.1(a)(iii) PCT.
4. The remaining dependent claims should also be adapted to the new independent claim 1. In particular it should be ensured that terminology used in the dependent claims is consistent with the terminology used in the new independent claim 1.
5. All amendments should be clearly and comprehensively indicated and the passages of the original application on which these amendments are based unambiguously identified.
6. The attention of the applicant is drawn to the fact that during re-editing no part of the application may be amended in such a way that it contains subject-matter which extends beyond the content of the application as filed, Article 34(2)(b) PCT.

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August 24, 2001

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PCT/EP00/07353

MASCO CORPORATION OF INDIANA, et al.

This is in reply to the written opinion under PCT Rule 66 of the International Preliminary Examining Authority mailed May 25, 2001.

A. Enclosed replacement sheets 4, 5, 6a, 6b, 15, 16, 17 and 18 are filed in triplicate, which shall replace the originally filed sheets 4, 5, 6, 15, 16, 17 and 18 of the application documents, and which, together with the originally filed sheets 1 to 3 and 7 to 14 of the description as well as the substitute drawing sheets 1/4 to 4/4 filed with letter of November 8, 2000, shall form the basis of the further proceedings.

B. New claims 1 to 17 (replacement sheets 15 to 18), in this order, go back to the originally filed claims 1 to 17; the functional interrelation of the features contained in new claim 1 becomes apparent from, e.g., page 8, line 18 to page 9, line 25 of the original description.

As a result, new claims 1 to 17 are admissible.

C. With respect to sub-sections **A.1** to **A.3** and **A.5** of the written opinion new claim 1 has been clarified to the effect that the spring 6 is dimensioned so that the cursor 3, with respect to the seat 2, will assume the first position or a position close to it under conditions in which the water flow demanded by the mixing device is relatively low, and will be shifted toward the second position or until it reaches it under conditions in which the water flow demanded by the mixing device is relatively high, wherein the cursor 3 comprises means 4, 5', 9 which, when the cursor 3 assumes the first position or a position close to it, permit the passage of a flow rate sufficient only to supply a mixing device with a relatively low water flow demand.

In this connection, it is to be noted that the inclusion of further features relating to the construction of the cursor 3, e.g. the small openings 4 and the large openings 5, into claim 1 would unduly restrict the scope of the claims which the applicants should be entitled to within the frame of a fair protection in view of the available state of the art, in particular upon considering the fact that the present application also contains embodiments in which the small openings 4 are replaced by openings 5' with a tapered shape (figs. 8 and 9; claims 9 and 10) or a flow rate regulator 9 (figs. 12 and 13; claims 12 and 13), and in which large openings are not necessarily present (figs. 10 to 13; claim 11).

Further, claim 1 has been clarified in that the body 1 has a holding seat 2 in order to address the objection under sub-section **A.4** of the written opinion.

D. With respect to sub-section **A.6** of the written

opinion claim 5 was amended to refer to an opening 4 with small dimensions, intended to permit the passage of a flow rate sufficient only to supply a mixing device with a relatively low water flow demand.

E. Claims 7, 8 and 10 have been amended to, amongst others, make clear that "*the first position*" refers to the cursor 3 (see sub-sections **A.7**, **B.9** and **B.10** of the written opinion).

F. Furthermore, all claims have been revised to contain reference signs (sub-section **C.2** of the written opinion), and to make sure that the same terminology is used throughout the claims (sub-section **C.4** of the written opinion).

G. Finally, the description (replacement sheets 4, 5, 6a and 6b) has been amended in order to bring it into conformity with the newly filed claims as requested under sub-section **C.3** of the written opinion.

H. With respect to document **D1** (US 5 240 036) which is considered to represent the closest prior art by the Examiner, the following remains to be noted:

Document **D1** which is not explicitly concerned with the water supply to a thermostatic mixing device, discloses -- see in particular fig. 1 in connection with the pertinent description in column 3, line 26 to column 4, line 24 -- a check valve having a housing 10 with an inlet 12 and an outlet 13, in which a spring member 28 biased valve member 14 is slidably arranged. The check valve further comprises sealing means which include a frusto-conical surface 47 on a part 38 of the housing 10, a frusto-conical surface 49 on the valve member 14 and an O-ring 50. The spring member 28 assures that the O-ring 50 sealingly

engages the frusto-conical surfaces 47 and 49. Finally, the valve member 14 has a rearward tubular guide extension 32 which is provided with circumferentially arranged openings 36.

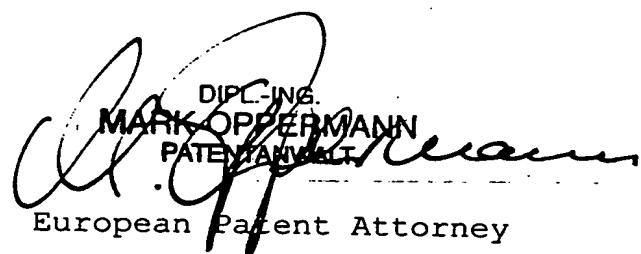
As soon as a pressure differential occurs across the valve member 14 due to any fluid flow into the inlet 12, the valve member 14 is shifted toward the outlet 13 and fluid flow occurs through the openings 36 and further ports 30 to the outlet 13, which are made as large as possible to avoid restriction of fluid flow.

From the above discussed disclosure of document D1 it is quite clear that the valve member 14 is either located in a closed position in which no fluid flow occurs, or an open position in which a fluid flow as large as possible occurs. Thus, the valve disclosed in document D1 solely functions as a check valve, i.e. a valve which shall not or as little as possible restrict a flow in the main direction, and in which a flow in the reverse direction will close the valve member on the valve seat and prevent reverse flow (in this connection, please also refer to column 5, lines 21 to 25 of document D1).

Against the above background the arguments presented under subsections B.3 to B.6 of the written opinion, according to which, amongst others, "a small amount of fluid can flow through these by-pass-holes (36) from the inlet (12) to the outlet (13) even when the cursor (14) is closed onto the main valve seat (47)", cannot be accepted. Document D1 actually fails to teach or suggest a means which, when the valve member assumes the closed position or a position close to it, permits the passage of a restricted flow rate only. Consequently, a discussion of document D1 in the introductory portion of the description is deemed to be not necessary.

I. Summarily, the subject-matter of the newly filed claim 1 is new and involves an inventive step over the available state of the art; since claims 2 to 17 are referred back to claim 1 directly or indirectly the same applies to the subject-matter of claims 2 to 17.

Issuance of a corresponding international preliminary examination report is respectfully requested.



DIPLO. ING.
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Encl.

Replacement sheets 4, 5, 6a, 6b,
15, 16, 17 and 18, in triplicate

- 4 -

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thermostatic mixing faucet is capable of and, under these conditions, any possible, even significant, pressure differences between the water supply pipelines will not cause any inconvenience.

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This provision ensures the perfect operation of a thermostatic mixing faucet, but it requires a maneuver, albeit a simple one, on the part of the user, and, furthermore, it cannot be applied to thermostatic mixing devices at whose inlet thin blocking plates are not installed.

10

In view of this, the primary purpose of this invention is to provide a valve intended to be installed at the inlet of a thermostatic mixing device of any kind, which would be suitable for automatically bringing about a performance in accordance with the one that is caused by the above-mentioned provision, causing a partial division of the passage cross-section, while the thermostatic mixing device supplies an apparatus with low water flow demand, which offers high resistance against the flow and, on the other hand, leaving the water supply line substantially clear, while the thermostatic mixing device supplies one or several apparatuses with a high overall water flow demand, which, together, gives rise to a low resistance against the flow.

25

Another object of the invention is to provide such an automatic valve, which would furthermore combine the function of a nonreturn valve as is required in many cases in which it is installed.

30

Yet another object of the invention is to provide such a valve, which would have a simple structure, be easy to

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manufacture, relatively cheap and so designed as to facilitate maintenance.

SUMMARY OF THE DISCLOSURE

5

The first object of the invention is achieved in a valve intended for installation in the inlet of a thermostatic mixing device by virtue of the fact that the valve comprises a tubular body intended to be inserted in or constitute part of 10 a pipe or connection for water supply, said body having a holding seat; a cursor that can be moved in said body with respect to said seat between a first position in which it at least partly occludes said seat, and a second position in which it leaves said seat substantially clear to permit the 15 passage of a relatively large flow rate, said cursor being subjected, on the one hand, to the pressure of the water supply pipeline and, on the other hand, to the pressure existing inside said mixing device; and a spring that works on said cursor, pushing it toward said first position, said 20 spring being dimensioned so that said cursor, with respect to said seat, will assume said first position or a position close to it under conditions in which the water flow demanded by said mixing device is relatively low, and will be shifted toward said second position or until it reaches it under 25 conditions in which the water flow demanded by said mixing device is relatively high; wherein said cursor comprises means which, when said cursor assumes said first position or a position close to it, permit the passage of a flow rate sufficient only to supply a mixing device with a relatively 30 low water flow demand.

In this way, when the water supply of an apparatus with low

- 6a -

water flow demand tends to cause inside the thermostatic mixing device the establishment of a pressure close to the water supply pressure, the small "difference" between these pressures causes the cursor to assume a position close to said 5 first position or coinciding with it and leaving clear a small passage cross-section, thus causing a pressure drop because of which the pressure that is actually established inside the thermostatic mixing device is limited and cannot give rise to any instability. When, on the other hand, the supply to 10 apparatuses having a high overall water flow demand is such that inside the thermostatic mixing device a very low pressure develops, then the cursor, pushed by a greater pressure difference, assumes a position close to the second position while coinciding with it, leaving clear a large passage cross- 15 section, thus not causing a pressure drop that would appreciably reduce the volume of water drawn, whereas, on the other hand, under these conditions, the thermostatic mixing device does not tend to display any unstable performance. The valve thus automatically -- and independently of the kind of 20 thermostatic mixing device involved -- brings about the same effect that can be achieved by an appropriate maneuver employed by the user according to the teaching in Italian Patent Application TO 99 A 000 455.

- 6b-

~~position or coinciding with it and leaving clear a small passage cross-section, thus causing a pressure drop because of which the pressure that is actually established inside the thermostatic mixing device is limited and cannot give rise to any instability. When, on the other hand, the supply to apparatuses having a high overall absorption is such that inside the thermostatic mixing device a very low pressure develops, then the cursor, pushed by a greater pressure difference, assumes a position close to the second position while coinciding with it, leaving clear a large passage cross-section, thus not causing a pressure drop that would appreciably reduce the volume of water drawn, whereas, on the other hand, under these conditions, the thermostatic mixing device does not tend to display any unstable performance. The valve thus automatically -- and independently of the kind of thermostatic mixing device involved -- brings about the same effect that can be achieved by an appropriate maneuver employed by the user according to the teaching in Italian Patent Application TO 99 A 000 455.~~

20

An automatic valve, according to the invention, can be inserted in only one water supply pipeline or in both, but preferably it is inserted only in the cold water supply pipeline.

25

The second object of the invention is achieved when the cursor in said first position occludes the seat totally. In this case, as a matter of fact, when no water is drawn or if the flow tends to assume a direction opposite to the normal direction, the cursor, shifting into said first position, completely occludes said seat so that the valve works like a nonreturn valve.

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CLAIMS:

1. An automatic valve intended for installation in the inlet of a thermostatic mixing device, comprising:

5 a tubular body (1) intended to be inserted in or constitute part of a pipe or connection for water supply, said body (1) having a holding seat (2);

10 a cursor (3) that can be moved in said body (1) with respect to said seat (2) between a first position in which it at least partly occludes said seat (2), and a second position in which it leaves said seat (2) substantially clear to permit the passage of a relatively large flow rate, said cursor (3) being subjected, on the one hand, to the pressure of the water supply pipeline and, on the other hand, to the pressure existing inside said mixing device; and

15 a spring (6) that works on said cursor (3), pushing it toward said first position, said spring (6) being dimensioned so that said cursor (3), with respect to said seat (2),

20 will assume said first position or a position close to it under conditions in which the water flow demanded by said mixing device is relatively low, and

will be shifted toward said second position or until it reaches it under conditions in which the water flow demanded by said mixing device is relatively high;

25 wherein said cursor (3) comprises means (4, 5', 9) which, when said cursor (3) assumes said first position or a position close to it, permit the passage of a flow rate sufficient only to supply a mixing device with a relatively low water flow demand.

30

2. Automatic valve according to Claim 1, wherein said cursor (3) in said first position totally occludes said seat (2) so

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that the valve will also work as a nonreturn valve.

3. Automatic valve according to Claim 1, wherein an element (7) intended to act as nonreturn valve is inserted in it.

5

4. Automatic valve according to Claim 3, wherein said element (7), functioning as a nonreturn valve, consists of a flexible and elastic membrane, arranged so as to occlude at least one passage opening (4), while the flow tends to assume 10 a direction opposite to the normal direction.

10

5. Automatic valve according to one of Claims 1 to 4, wherein said cursor (3) has at least one opening (4) with small dimensions, intended to permit the passage of a flow 15 rate sufficient only to supply a mixing device with a relatively low water flow demand.

15

6. Automatic valve according to Claim 5, wherein at least one opening (4) with small dimensions is permanently pervious.

20

7. Automatic valve according to Claim 5, wherein said opening (4) with small dimensions is situated up the line from said seat (2) when said cursor (3) assumes said first position, and becomes pervious only when said cursor (3) 25 undergoes a minor shift toward its second position.

25

8. Automatic valve according to one of Claims 1 to 4, wherein said cursor (3) comprises openings (5) with large dimensions which are situated up the line from said seat (2) 30 when said cursor (3) assumes said first position or a position close to it, and which become pervious when said cursor (3) shifts toward its second position or reaches it.

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9. Automatic valve according to Claim 8, wherein said openings (5') with large dimensions have a tapered form so as to become pervious in an increasing manner, along with the
5 increase in the shift of said cursor (3) from said first position to said second position.

10. Automatic valve according to Claim 9, wherein said openings (5') with the tapered shape are situated entirely up
10 the line from said seat (2) when said cursor (3) assumes said first position so that the valve will also work as a nonreturn valve.

11. Automatic valve according to one of Claims 1 to 10,
15 wherein said cursor (3) has a holding packing (8), acting in said first position with respect to said seat (2), and whose removal, when said cursor (3) is shifted toward said second position, clears wide passage cross-sections.

20 12. Automatic valve according to one of Claims 1 to 4, wherein a known flow rate regulator (9) is mounted in said cursor (3), whose substantially constant flow rate is adapted to the anticipated supply flow rate of a mixing device with a relatively low water flow demand.

25 13. Automatic valve according to Claim 12, wherein said flow rate regulator (9) is of a type provided with means that act as nonreturn valve.

30 14. Automatic valve according to one of the preceding claims, which is installed in both water supply pipelines of a thermostatic mixing device.

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15. Automatic valve according to one of Claims 1 to 13, which is installed in only one of the water supply pipelines of a thermostatic mixing device.

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16. Automatic valve according to Claim 15, which is installed in the cold water supply pipeline going to a thermostatic mixing device.

10 17. Thermostatic mixing device which is provided with at least one automatic stabilization valve according to one or several of the preceding claims.

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thermostatic mixing faucet is capable of and, under these conditions, any possible, even significant, pressure differences between the water supply pipelines will not cause any inconvenience.

5

This provision ensures the perfect operation of a thermostatic mixing faucet, but it requires a maneuver, albeit a simple one, on the part of the user, and, furthermore, it cannot be applied to thermostatic mixing devices at whose inlet thin blocking plates are not installed.

In view of this, the primary purpose of this invention is to provide a valve intended to be installed at the inlet of a thermostatic mixing device of any kind, which would be suitable for automatically bringing about a performance in accordance with the one that is caused by the above-mentioned provision, causing a partial division of the passage cross-section, while the thermostatic mixing device supplies an apparatus with low absorption, which offers high resistance against the flow and, on the other hand, leaving the water supply line substantially clear, while the thermostatic mixing device supplies one or several apparatuses with a high overall absorption, which, together, gives rise to a low resistance against the flow.

25

Another object of the invention is to provide such an automatic valve, which would furthermore combine the function of a nonreturn valve as is required in many cases in which it is installed.

30

Yet another object of the invention is to provide such a valve, which would have a simple structure, be easy to

manufacture, relatively cheap and so designed as to facilitate maintenance.

SUMMARY OF THE DISCLOSURE

5

The first object of the invention is achieved in a valve intended to be installed at the inlet of a thermostatic mixing device by virtue of the fact that the valve comprises a tubular body intended to be inserted or to be part of a 10 pipeline or water supply connection, a holding seat presented by said body, a cursor that can move in said body with respect to said seat between a first position, in which it at least partly occludes said seat, and a second position in which it leaves said seat substantially clear, said cursor being 15 subjected, on the one hand, to the pressure of the water supply pipeline and, on the other hand, to the pressure existing inside the thermostatic mixing device, and a spring that acts upon said cursor, moving it toward the occlusion position, said spring being so dimensioned that said cursor, 20 with respect to said seat, will assume a position that brings about a reduced passage cross-section under conditions involving the supply of an apparatus having low absorption, and that, with respect to the seat, it will assume a position that brings about a large passage cross-section under 25 conditions involving the supply of apparatuses having a high overall absorption.

In this way, when the water supply of an apparatus with low absorption tends to cause inside the thermostatic mixing 30 device the establishment of a pressure close to the water supply pressure, the small difference between these pressures causes the cursor to assume a position close to said first

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position or coinciding with it and leaving clear a small passage cross-section, thus causing a pressure drop because of which the pressure that is actually established inside the thermostatic mixing device is limited and cannot give rise to
5 any instability. When, on the other hand, the supply to apparatuses having a high overall absorption is such that inside the thermostatic mixing device a very low pressure develops, then the cursor, pushed by a greater pressure difference, assumes a position close to the second position
10 while coinciding with it, leaving clear a large passage cross-section, thus not causing a pressure drop that would appreciably reduce the volume of water drawn, whereas, on the other hand, under these conditions, the thermostatic mixing device does not tend to display any unstable performance. The
15 valve thus automatically -- and independently of the kind of thermostatic mixing device involved -- brings about the same effect that can be achieved by an appropriate maneuver employed by the user according to the teaching in Italian Patent Application TO 99 A 000 455.

20

An automatic valve, according to the invention, can be inserted in only one water supply pipeline or in both, but preferably it is inserted only in the cold water supply pipeline.

25

The second object of the invention is achieved when the cursor in said first position occludes the seat totally. In this case, as a matter of fact, when no water is drawn or if the flow tends to assume a direction opposite to the normal
30 direction, the cursor, shifting into said first position, completely occludes said seat so that the valve works like a nonreturn valve.

CLAIMS:

1. A valve intended for installation in the inlet of a thermostatic mixing device, characterized in that it comprises
5 a tubular body intended to be inserted in or constitute part of a pipe or connection for water supply, a holding seat presented by said body, a cursor that can be moved in said body with respect to said seat between a first position in which it at least partly occludes said seat and a second
10 position in which it leaves said seat substantially clear, said cursor being subjected, on the one hand, to the pressure of the water supply pipeline and, on the other hand, to the pressure existing inside the thermostatic mixing device, and a spring that works on said cursor, pushing it toward the
15 occlusion position, said spring being dimensioned so that the cursor, with respect to the seat, will assume a position that brings about a reduced passage cross-section under conditions involved in the water supply of an apparatus that has a low degree of absorption and in which, with respect to the seat,
20 it assumes a position causing a large passage cross-section under conditions involved in the water supply of apparatuses featuring a total high absorption.
2. Automatic valve according to Claim 1, characterized in
25 that the cursor in said first position totally occludes said seat so that the valve will also work as a nonreturn valve.
3. Automatic valve according to Claim 1, characterized in
that an element intended to act as nonreturn valve is inserted
30 in it.
4. Automatic valve according to Claim 3, characterized in

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that said element, functioning as a nonreturn valve, consists of a flexible and elastic membrane, arranged so as to occlude at least one passage opening, while the flow tends to assume a direction opposite to the normal direction.

5

5. Automatic valve according to one of Claims 1 to 4, characterized in that said cursor has at least one opening with small dimensions, intended to permit the passage of a flow rate sufficient only to supply an apparatus with low absorption.

10

6. Automatic valve according to Claim 5, characterized in that at least one opening with small dimensions is permanently pervious.

15

7. Automatic valve according to Claim 5, characterized in that said opening, at least having small dimensions, is situated in the first position up the line from said seat and becomes pervious only when the cursor undergoes a minor shift 20 toward its second position.

20

8. Automatic valve according to one of Claims 1 to 4, characterized in that said cursor presents openings with large dimensions, situated in the first position or in a position 25 close to it up the line from said seat, which belong pervious when the cursor shifts toward its second position or reaches it.

25

9. Automatic valve according to Claim 8, characterized in 30 that said openings with large dimensions have a tapered form so as to become pervious in an increasing manner, along with the increase in the shift of the cursor from the first

position to the second position.

10. Automatic valve according to Claim 9, characterized in that said openings with the tapered shape are situated in the 5 first position entirely up the line from said seat so that the valve will also work as a nonreturn valve.

11. Automatic valve according to one of Claims 1 to 11, characterized in that said cursor has a holding packing, 10 acting in the first position with respect to said seat, and whose removal, when the cursor is shifted toward the second position, clears wide passage cross-sections.

12. Automatic valve according to one of Claims 1 to 4, 15 characterized in that mounted in said cursor is a known flow rate regulator whose substantially constant flow rate is adapted to the anticipated supply flow rate of an apparatus with low absorption.

20 13. Automatic valve according to Claim 12, characterized in that said flow rate regulator is of a type provided with means that act as nonreturn valve.

25 14. Automatic valve according to one of the preceding claims, characterized by its installation in both water supply pipelines of a thermostatic mixing device.

30 15. Automatic valve according to one of Claims 1 to 13, characterized by its installation in only one of the water supply pipelines of a thermostatic mixing device.

16. Automatic valve according to Claim 15, characterized by

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its installation in the cold water supply pipeline going to a thermostatic mixing device.

17. Thermostatic mixing device, characterized in that it is
5 provided with at least one automatic stabilization valve,
according to one or several of the above claims.

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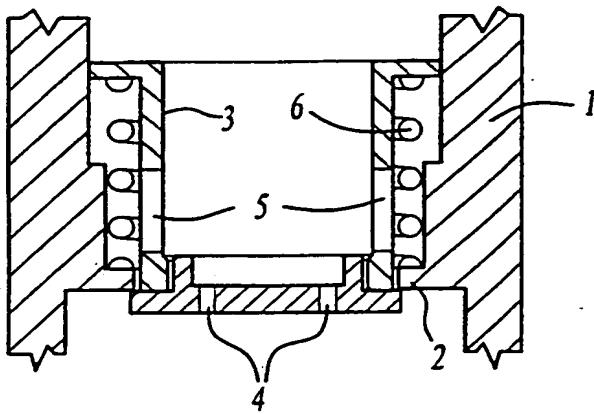


Fig-1

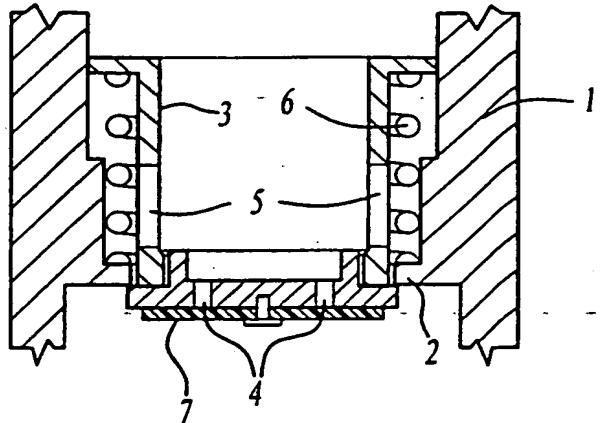


Fig-3

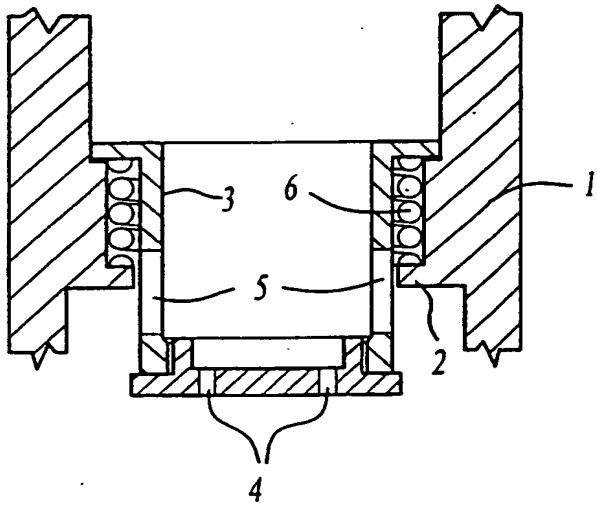


Fig-2

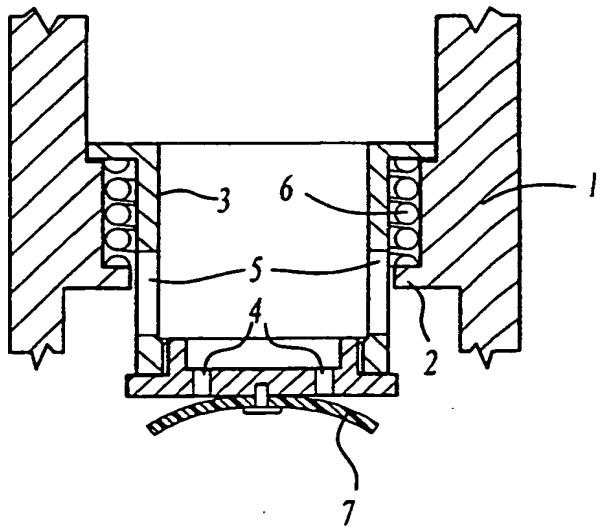


Fig-4

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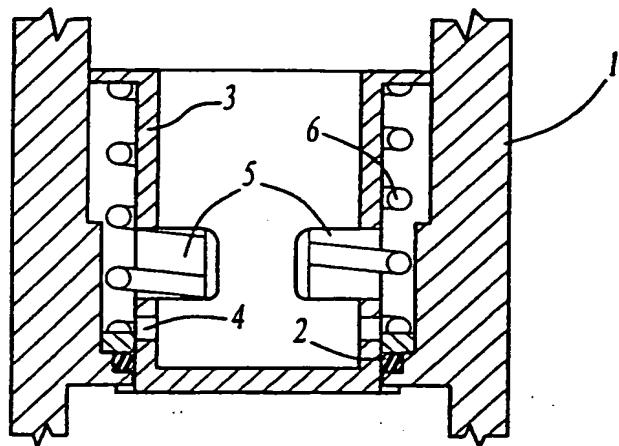


Fig-5

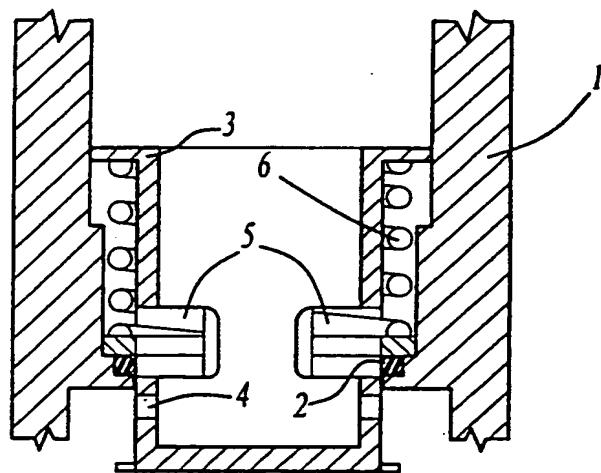


Fig-6

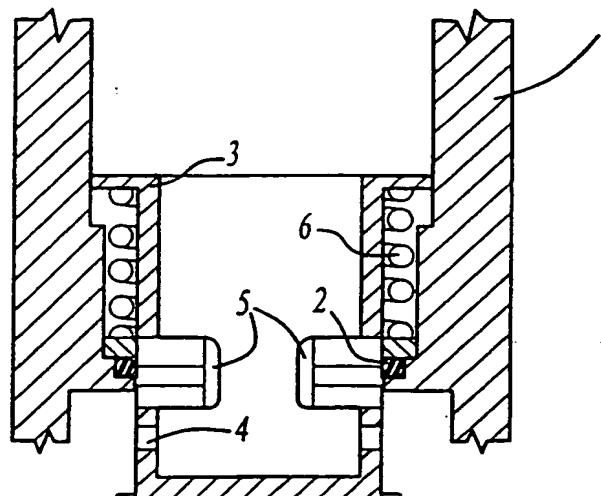


Fig-7

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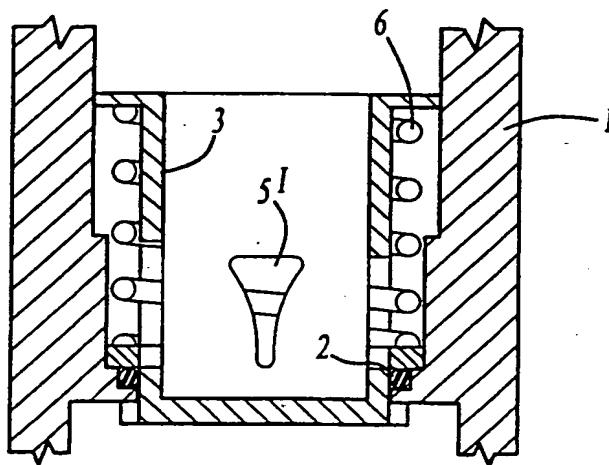


Fig-8

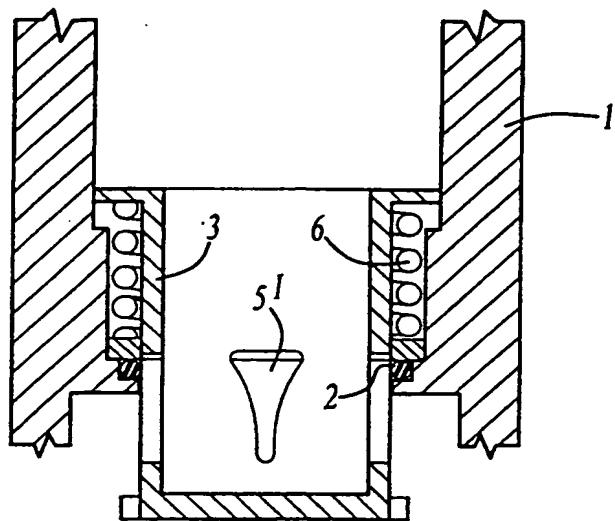


Fig-9

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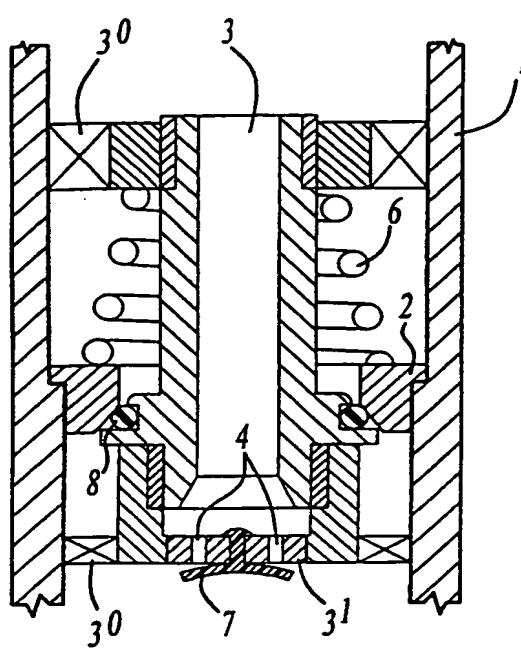


Fig-10

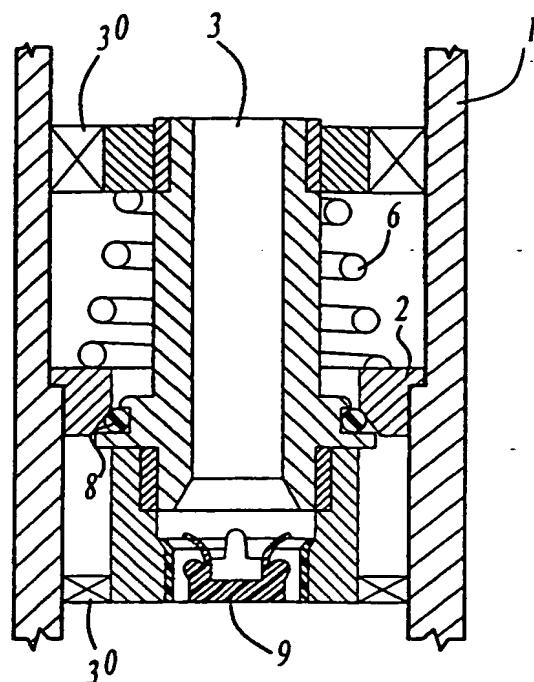


Fig-12

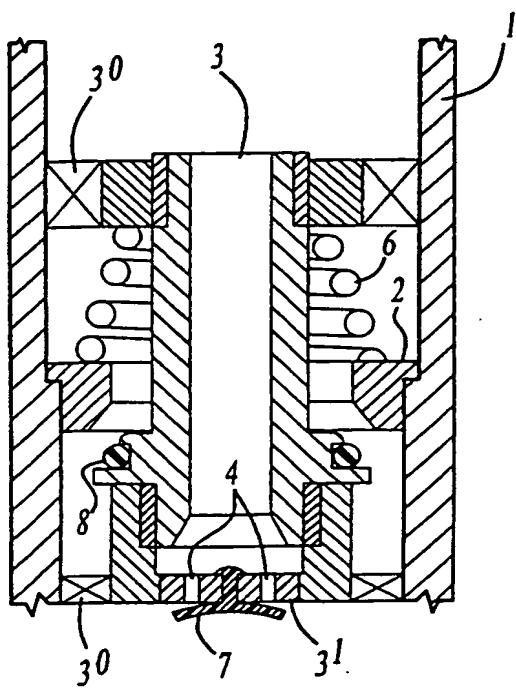


Fig-11

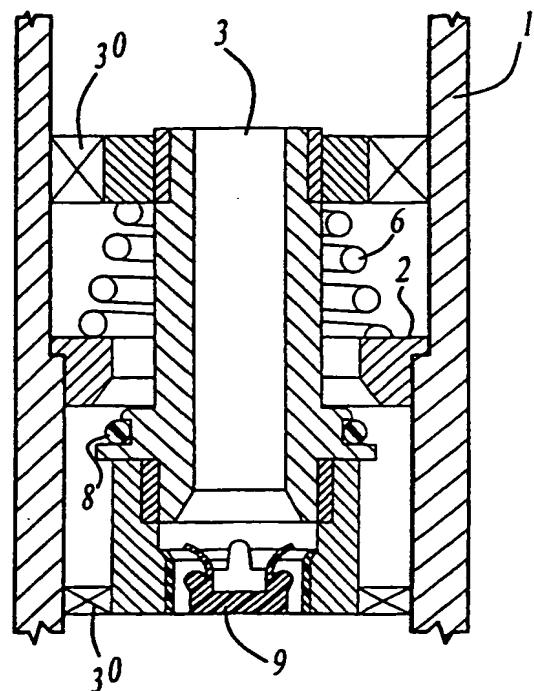


Fig-13

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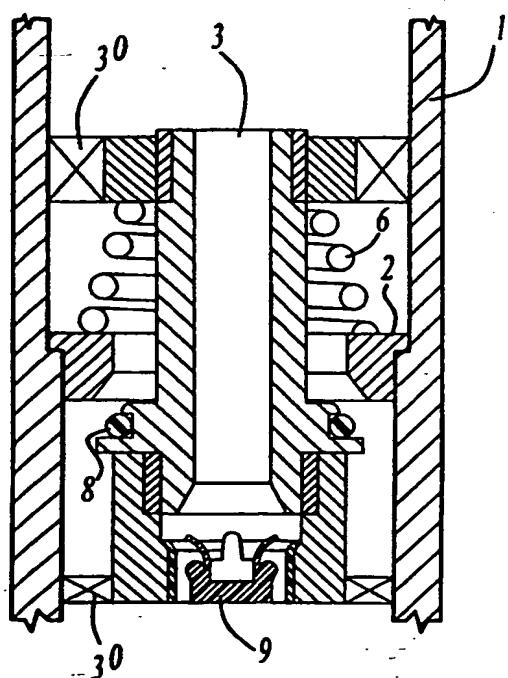
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(54) Title: AUTOMATIC VALVE FOR THE STABILIZATION OF A THERMOSTATIC MIXING DEVICE

(57) Abstract: A valve intended for installation in the inlet of a thermostatic mixing device comprises a tubular body (1) intended to be inserted in a water supply pipe, a holding seat (2) presented by the body (1), and a cursor (3) that can be moved in the body (1) with respect to the seat (2) between a first position (Figure 12) in which it at least partly occludes the seat (2) and a second position (Figure 13) in which it leaves the seat (2) substantially clear. The cursor (3) is subjected, on the one hand, to the pressure of the water supply pipeline and, on the other hand, to the pressure existing inside the thermostatic mixing device. The valve further comprises a spring (6) that works on the cursor (3), pushing it toward the occlusion position. The valve can also comprise means that act as a non-return valve, and it can be equipped with a flow rate regulator (9).



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**AUTOMATIC VALVE FOR THE STABILIZATION
OF A THERMOSTATIC MIXING DEVICE**

TECHNICAL FIELD

This invention relates to an automatic valve intended for installation in the inlet of a thermostatic mixing device to stabilize its operation.

BACKGROUND OF THE DISCLOSURE

When a thermostatic mixing device, designed to be able to draw a certain flow rate, supplies an apparatus which, because of the high resistance that it creates against the flow, permits only the delivery of a much lesser flow rate, the pressure inside the thermostatic mixing device becomes close to the pressure in the water supply pipelines. If there develops, then, a considerable pressure difference between the hot water and the cold water supply pipelines, for example, due to the absorption of an apparatus with a high flow rate, such as a flowmeter flushing water device inserted on one of the pipelines due to the crosswise flow (the so-called cross-flow) that develops inside the thermostatic mixing device, the latter is in a state of instability or begins to oscillate with subsequent malfunctioning and instability of the temperature of the mixed water drawn by it.

This happens, for example, when a thermostatic mixing device, intended to supply in the absence of a strong resistance at the outlet a relatively high flow rate, such as, for example, 50 or 60 liters per minute at 3 bar, is used with a much lesser water delivery volume, for example, 9 liters per

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minute, which is limited by the resistance offered to the flow by certain apparatuses. This case occurs, in particular, when the thermostatic mixing device is installed to supply a multiple shower stall, each of which is equipped with its own exclusion device, while the user employs only one shower. More generally, the same case occurs when the thermostatic mixing device is arranged to supply a plurality of apparatuses or only one or a few of them are actually in operation.

10 This inconvenience can be remedied by installing a pressure compensator in the water supply pipelines up the line from the thermostatic mixing device. However, this additional apparatus increases the size and complexity of the installation also because it must be linked to both of the cold water and hot
15 water supply pipes; that increases the cost of the apparatuses and the installation operations; besides, it is a rather delicate operation; it is easily subject to failure, especially due to deposits, and calls for a certain degree of maintenance. Its operation is not entirely satisfactory
20 because, when the pressure in a pipeline is reduced, the compensator reduces the passage offered to the other pipeline and thus corrects the mixing ratio but modifies the flow rate that is actually drawn. Furthermore, under certain conditions, a pressure compensator can give rise to instability
25 phenomenon.

According to Italian Patent Application No. 99 A 000 455, a thermostatic mixing device, controlled by thin obstruction plates situated at its inlet, can be arranged so as to function correctly, both when the maximum flow rates for which it was designed are drawn and also when reduced flow rates are drawn in the water supply lines of apparatuses with high flow

resistance without entailing the above-mentioned inconvenience and without necessitating a pressure compensator by having the user arrange the thermostatic mixing faucet so as to adapt it to the various conditions of use or to the power supply of 5 apparatuses that absorb flow rates that differ widely among each other.

This can be achieved by virtue of the fact that the entry passage openings of the thin blocking plates, which control 10 the inlet pipes for the hot water and for the cold water, are shaped in relation to at least one of the pipelines for hot water and for cold water so as to present restricted passage cross-sections in a field adjacent to the occlusion position and large cross-section passage segments in the remaining 15 regulating field.

In this way, when the thermostatic mixing faucet must supply one or several apparatuses that take a small flow rate, it is moved in its first regulation field, which takes place the 20 moment the thermostatic mixing faucet is shifted from the occlusion position. The restricted cross-section of at least one of the entry passage openings then causes a relatively high pressure drop, although in the presence of a small flow rate caused by the high resistance at the outlet, and makes 25 the thermostatic mixing faucet practically insensitive (to the effects of its stability) in contrast to the also significant pressure differences between the water supply pipelines. When, on the other hand, the thermostatic mixing faucet must supply apparatuses that absorb a large flow rate, it is moved into 30 its second regulating field, which follows the first one. The large cross-section of the entry passage openings then makes it possible to draw the maximum flow rate that the

- 4 -

thermostatic mixing faucet is capable of and, under these conditions, any possible, even significant, pressure differences between the water supply pipelines will not cause any inconvenience.

5

This provision ensures the perfect operation of a thermostatic mixing faucet, but it requires a maneuver, albeit a simple one, on the part of the user, and, furthermore, it cannot be applied to thermostatic mixing devices at whose inlet thin blocking plates are not installed.

In view of this, the primary purpose of this invention is to provide a valve intended to be installed at the inlet of a thermostatic mixing device of any kind, which would be suitable for automatically bringing about a performance in accordance with the one that is caused by the above-mentioned provision, causing a partial division of the passage cross-section, while the thermostatic mixing device supplies an apparatus with low absorption, which offers high resistance against the flow and, on the other hand, leaving the water supply line substantially clear, while the thermostatic mixing device supplies one or several apparatuses with a high overall absorption, which, together, gives rise to a low resistance against the flow.

25

Another object of the invention is to provide such an automatic valve, which would furthermore combine the function of a nonreturn valve as is required in many cases in which it is installed.

30

Yet another object of the invention is to provide such a valve, which would have a simple structure, be easy to

- 5 -

manufacture, relatively cheap and so designed as to facilitate maintenance.

SUMMARY OF THE DISCLOSURE

5

The first object of the invention is achieved in a valve intended to be installed at the inlet of a thermostatic mixing device by virtue of the fact that the valve comprises a tubular body intended to be inserted or to be part of a 10 pipeline or water supply connection, a holding seat presented by said body, a cursor that can move in said body with respect to said seat between a first position, in which it at least partly occludes said seat, and a second position in which it leaves said seat substantially clear, said cursor being 15 subjected, on the one hand, to the pressure of the water supply pipeline and, on the other hand, to the pressure existing inside the thermostatic mixing device, and a spring that acts upon said cursor, moving it toward the occlusion position, said spring being so dimensioned that said cursor, 20 with respect to said seat, will assume a position that brings about a reduced passage cross-section under conditions involving the supply of an apparatus having low absorption, and that, with respect to the seat, it will assume a position that brings about a large passage cross-section under 25 conditions involving the supply of apparatuses having a high overall absorption.

In this way, when the water supply of an apparatus with low absorption tends to cause inside the thermostatic mixing 30 device the establishment of a pressure close to the water supply pressure, the small difference between these pressures causes the cursor to assume a position close to said first

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position or coinciding with it and leaving clear a small passage cross-section, thus causing a pressure drop because of which the pressure that is actually established inside the thermostatic mixing device is limited and cannot give rise to
5 any instability. When, on the other hand, the supply to apparatuses having a high overall absorption is such that inside the thermostatic mixing device a very low pressure develops, then the cursor, pushed by a greater pressure difference, assumes a position close to the second position
10 while coinciding with it, leaving clear a large passage cross-section, thus not causing a pressure drop that would appreciably reduce the volume of water drawn, whereas, on the other hand, under these conditions, the thermostatic mixing device does not tend to display any unstable performance. The
15 valve thus automatically -- and independently of the kind of thermostatic mixing device involved -- brings about the same effect that can be achieved by an appropriate maneuver employed by the user according to the teaching in Italian Patent Application TO 99 A 000 455.

20

An automatic valve, according to the invention, can be inserted in only one water supply pipeline or in both, but preferably it is inserted only in the cold water supply pipeline.

25

The second object of the invention is achieved when the cursor in said first position occludes the seat totally. In this case, as a matter of fact, when no water is drawn or if the flow tends to assume a direction opposite to the normal
30 direction, the cursor, shifting into said first position, completely occludes said seat so that the valve works like a nonreturn valve.

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The second object of the invention can also be achieved -- even if the cursor in said first position does not totally occlude said seat -- by inserting in the valve an element, for 5 example, a flexible and elastic membrane arranged so as to occlude at least one passage opening, while the flow tends to assume a direction opposite to the normal direction.

10 The structure of the valve, according to the invention, can assume various configurations that are specifically indicated in the following description and in the subclaims. These and other features, objects and advantages of the object of this invention will appear more clearly in the following description of some embodiments, constituting nonrestrictive 15 examples, with reference to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Reference now is made to the accompanying drawings in which:

20

Figure 1 is a diametrical cross-section; illustrating a first embodiment among the simplest possible ones of the valve, according to the invention, in its first position;

25

Figure 2 illustrates the valve, according to said first embodiment, in its second position;

30

Figure 3 and Figure 4 illustrate, respectively, in the first and in the second positions, a second embodiment of the valve, according to the invention;

Figure 5, Figure 6 and Figure 7 illustrate in three

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different operating positions a third embodiment of the valve, according to the invention;

Figure 8 and Figure 9 illustrate, respectively, in the 5 first and in the second positions, a fourth embodiment of the valve, according to the invention;

Figure 10 and Figure 11 illustrate, respectively, in the 10 first and in the second positions, a fifth embodiment of the valve, according to the invention; and

Figure 12 and Figure 13 illustrate, respectively, in the first and in the second positions, a sixth embodiment of the valve, according to the invention.

15

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to Figures 1 and 2, a first, very simple embodiment of the valve, according to the invention, comprises 20 a tubular body 1 intended to be inserted in or constitute part of at least one pipeline or connection for supplying a thermostatic mixing device, a holding seat 2 presented by said body 1, and a cursor 3 that can be moved in said body 1 with respect to said seat 2 between a first position (Figure 1) in 25 which it partially occludes said seat 2 and a second position (Figure 2) in which it substantially leaves said seat 2 clear. This cursor is obviously subjected, on the one hand, to the (higher) pressure (according to the figures) of the water supply pipeline and, on the other hand, to the pressure (which 30 is lower, according to the figures) that is present inside the thermostatic device. Cursor 3 has one or several openings 4, which are always pervious and which are so dimensioned as to

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allow the passage of a flow that is sufficient only to supply an apparatus with low intake, and openings 5, which are so dimensioned as to permit the passage of a large flow, which become pervious only when cursor 3 leaves its first position 5 and moves toward the second position or reaches it. The valve furthermore comprises a spring 6 that acts on cursor 3, moving it toward the first occlusion position, and said spring 6 is so dimensioned that the pressure drop that is experienced by a small flow through openings 4 will not be sufficient to 10 overcome the force of the spring when it is required to expose passage openings 5 so that cursor 3, with respect to seat 2, maintains a position that causes a reduced passage cross-section, that is, the cross-section of openings 4 only, under conditions involving the supply of an apparatus with low 15 absorption. On the other hand, under conditions involving the supply of apparatuses having a high overall absorption, the pressure difference that works on cursor 3 (downward, according to the figures), overcoming the force of spring 6, shifts cursor 3 toward the second position or until it reaches 20 it (Figure 2) and uncovers the passage openings 5. In this way, cursor 3, with respect to seat 2, assumes a position that brings about a large passage cross-section under conditions involving the supply of apparatuses having a high overall absorption, and it does not obstruct the passage of a large 25 flow rate.

It follows from this that the valve protects the thermostatic mixing device, preventing the development of a high pressure in it when a low-absorption apparatus is supplied, while the 30 valve does not appreciably obstruct the flow when one or several apparatuses with high overall absorption are supplied.

- 10 -

Figures 3 and 4 show how the valve, according to the preceding figures, can in a simple manner be made to work also as a nonreturn valve. In this case, a flexible and elastic membrane 7 is applied to cursor 3, corresponding to its openings 4. As long as no flow runs through the valve or if the flow tends to be inverted, membrane 7 occludes openings 4, while openings 5 are not pervious because spring 6 keeps the valve in its first position. A flow in the opposite direction is thus prevented. On the other hand, the moment an even minimal pressure difference develops at the heads of the valves in the normal direction of water supply, membrane 7 is lifted, thus clearing openings 4. This is represented in correspondence to the second position of the valve in Figure 4; but it is understood that membrane 7 is raised in the presence of a small flow also if cursor 3 remains in its first position or close to it.

The valve according to Figures 5 and 7 differs from the one according to Figures 1 and 2 only by virtue of the fact that in cursor 3, opening 4, intended to permit the passage of a reduced flow, is also located in the first position up the line from seat 2 and precisely between openings 5 that are intended to permit the passage of a strong flow and seat 2. Therefore, when cursor 3 is in its first position (Figure 5), it completely occludes seat 2: the valve thus works as a nonreturn valve. When a small pressure difference is developed at the heads of the valve, spring 6 permits only a small shift of cursor 3, which remains in the proximity of its first position (Figure 6), while only opening 4 is exposed, permitting the passage of a reduced flow and preventing the establishment of a high pressure in the thermostatic mixing device. By increasing the pressure difference at the heads of the valve, spring 6 permits a further shift of cursor 3 toward

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its second position (Figure 7) and openings 5, which permit the passage of a large flow, are then uncovered.

The valve, according to Figures 8 and 9, works in an entirely similar fashion; here, small passage openings 4 and large passage openings 5 are replaced by openings 5' that have a shape that tapers toward seat 2, which thus assume the functions both of openings 4 and of openings 5 with a gradual increase in the pressure cross-section, along with the increase in the shift of cursor 3. The valve, thus described, also has a nonreturn function because openings 5', with their tapered shape, are entirely up the line from seat 2 when the valve is in the resting position.

The valve, according to Figures 10 and 11, operates in the same way as a valve, although it also acts as a nonreturn valve, according to Figures 3 and 4, with cursor 3 having a more elaborate structure; in this case, it is made up of several parts to ensure safe guidance in body 1 and to permit a more free passage of the flow in the second position of the valve. In this case, cursor 3 has parts 3⁰, which run against the internal surface of body 1 to guide the cursor, and it brings about a closure on seat 2 by means of a packing 8. The removal of this packing 8 from seat 2 brings about large passage cross-sections, which replace openings 5. In this case, openings 4, with which cooperates nonreturn membrane 7, can be made in a part 3' of cursor 3, which can be replaced. It thus becomes possible in the best way to adapt to the operating characteristics of the valve, both to the flow rate required by the apparatus with the lesser absorption, which is to be supplied with water, and to the pressure that normally exists in the water supply network.

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In the embodiment, according to Figures 12 and 13, which, by the way, is similar to the embodiment, according to Figures 10 and 11, openings 4 with a small cross-section are replaced by 5 a so-called flow rate regulator 9. A flow rate regulator is a known accessory, which is commercially available; it always permits the passage of a flow rate close to a predetermined value, regardless of the pressure that may develop at its heads (within certain limits). Therefore, this accessory 10 replaces narrow openings 4 in the valve according to the invention and, with respect to them, offers the advantage that it does not have to be adapted to the pressure normally prevailing in the water supply network.

15 These flow rate regulators are commercially available also connected to a nonreturn valve (for example, according to German Patent Application No. 196 03 393) and can as such be applied in the valves, according to the invention, in cases where it is advisable to prevent an inverted flow.

20

It must be understood that a flow rate regulator can be employed by way of substitution of openings 4 with a small cross-section also in some of the embodiments described earlier.

25

As noted earlier, the automatic valve, according to the invention, can be inserted in both hot water and cold water supply pipelines or alternately in only one of them, preferably the one for the cold water, while the other water 30 supply pipeline does not have any such valve.

The user, therefore, does not have to preset the thermostatic

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mixing device for correct operation under conditions different from those selected by him because that job is automatically done by the valve according to the invention. In addition to making the entire operation much easier for the user, this
5 also prevents any possibility of error on the part of the user.

A valve intended for installation in the inlet of a thermostatic mixing device is disclosed, which comprises a
10 tubular body intended to be inserted in a water supply pipe, a holding seat presented by said body, a cursor that can be moved in the body with respect to the seat between a first position in which it at least partly occludes the seat and a second position in which it leaves the seat substantially
15 clear, said cursor being subjected, on the one hand, to the pressure of the water supply pipeline and, on the other hand, to the pressure existing inside the thermostatic mixing device, and a spring that works on the cursor, pushing it toward the occlusion position, said spring being dimensioned
20 so that the cursor, with respect to the seat, will assume a position that brings about a reduced passage cross-section under conditions involved in the water supply of an apparatus that has a low degree of absorption and in which, with respect to the seat, it assumes a position causing a large passage
25 cross-section under conditions involved in the water supply of apparatuses featuring a total high absorption. The valve can also comprise means that act as a nonreturn valve, and it can be equipped with a flow rate regulator.

30 It must be understood that the invention is not confined to the embodiments described and illustrated by way of example. A number of modifications, in addition to those already

- 14 -

described, are within the reach of the expert in the field, for example, the various passage openings can be configured in various ways, and in this way, one can come up with various configurations of a nonreturn device. Besides, the valves can 5 also be completed by other accessories such as, for example, a water filtration net.

These and other modifications and any substitution with technical equivalents can be introduced to the devices 10 described and illustrated without departing from the scope and spirit of the present invention as defined by the appended claims.

CLAIMS:

1. A valve intended for installation in the inlet of a thermostatic mixing device, characterized in that it comprises
5 a tubular body intended to be inserted in or constitute part of a pipe or connection for water supply, a holding seat presented by said body, a cursor that can be moved in said body with respect to said seat between a first position in which it at least partly occludes said seat and a second
10 position in which it leaves said seat substantially clear, said cursor being subjected, on the one hand, to the pressure of the water supply pipeline and, on the other hand, to the pressure existing inside the thermostatic mixing device, and a spring that works on said cursor, pushing it toward the
15 occlusion position, said spring being dimensioned so that the cursor, with respect to the seat, will assume a position that brings about a reduced passage cross-section under conditions involved in the water supply of an apparatus that has a low degree of absorption and in which, with respect to the seat,
20 it assumes a position causing a large passage cross-section under conditions involved in the water supply of apparatuses featuring a total high absorption.
2. Automatic valve according to Claim 1, characterized in
25 that the cursor in said first position totally occludes said seat so that the valve will also work as a nonreturn valve.
3. Automatic valve according to Claim 1, characterized in
30 that an element intended to act as nonreturn valve is inserted in it.
4. Automatic valve according to Claim 3, characterized in

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that said element, functioning as a nonreturn valve, consists of a flexible and elastic membrane, arranged so as to occlude at least one passage opening, while the flow tends to assume a direction opposite to the normal direction.

5

5. Automatic valve according to one of Claims 1 to 4, characterized in that said cursor has at least one opening with small dimensions, intended to permit the passage of a flow rate sufficient only to supply an apparatus with low
10 absorption.

10

6. Automatic valve according to Claim 5, characterized in that at least one opening with small dimensions is permanently pervious.

15

7. Automatic valve according to Claim 5, characterized in that said opening, at least having small dimensions, is situated in the first position up the line from said seat and becomes pervious only when the cursor undergoes a minor shift
20 toward its second position.

20

8. Automatic valve according to one of Claims 1 to 4, characterized in that said cursor presents openings with large dimensions, situated in the first position or in a position
25 close to it up the line from said seat, which belong pervious when the cursor shifts toward its second position or reaches it.

25

9. Automatic valve according to Claim 8, characterized in
30 that said openings with large dimensions have a tapered form so as to become pervious in an increasing manner, along with the increase in the shift of the cursor from the first

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position to the second position.

10. Automatic valve according to Claim 9, characterized in that said openings with the tapered shape are situated in the 5 first position entirely up the line from said seat so that the valve will also work as a nonreturn valve.

11. Automatic valve according to one of Claims 1 to 11, characterized in that said cursor has a holding packing, 10 acting in the first position with respect to said seat, and whose removal, when the cursor is shifted toward the second position, clears wide passage cross-sections.

12. Automatic valve according to one of Claims 1 to 4, 15 characterized in that mounted in said cursor is a known flow rate regulator whose substantially constant flow rate is adapted to the anticipated supply flow rate of an apparatus with low absorption.

20 13. Automatic valve according to Claim 12, characterized in that said flow rate regulator is of a type provided with means that act as nonreturn valve.

25 14. Automatic valve according to one of the preceding claims, characterized by its installation in both water supply pipelines of a thermostatic mixing device.

30 15. Automatic valve according to one of Claims 1 to 13, characterized by its installation in only one of the water supply pipelines of a thermostatic mixing device.

16. Automatic valve according to Claim 15, characterized by

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its installation in the cold water supply pipeline going to a thermostatic mixing device.

17. Thermostatic mixing device, characterized in that it is
5 provided with at least one automatic stabilization valve,
according to one or several of the above claims.

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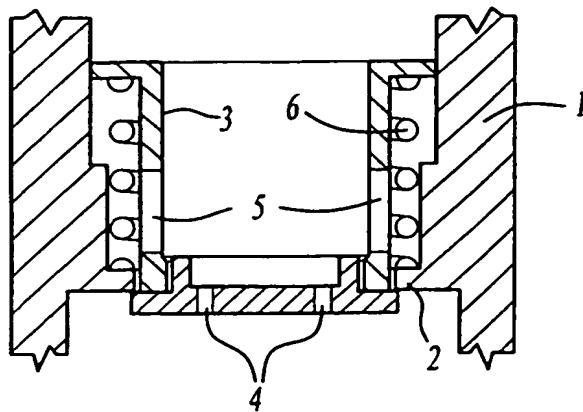


Fig-1

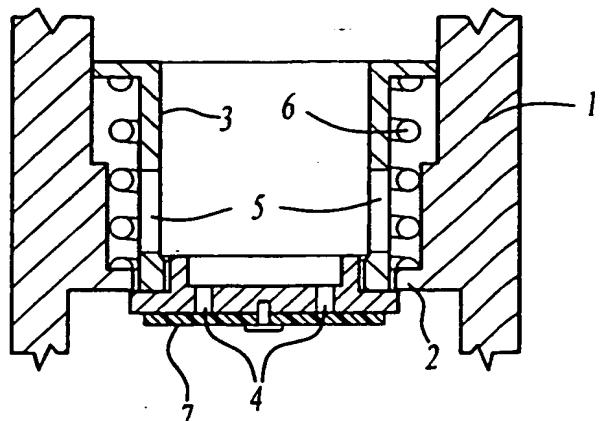


Fig-3

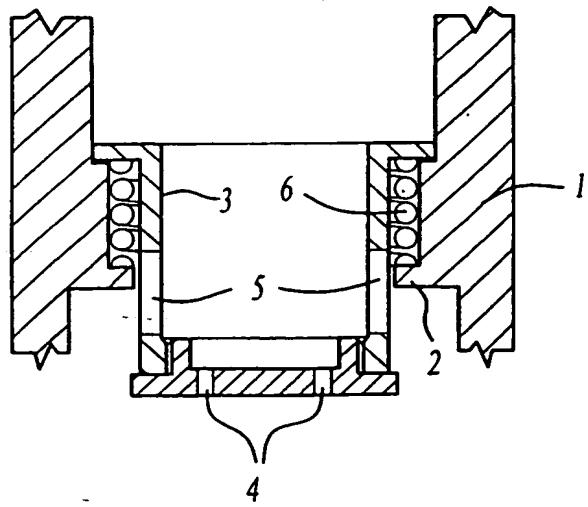


Fig-2

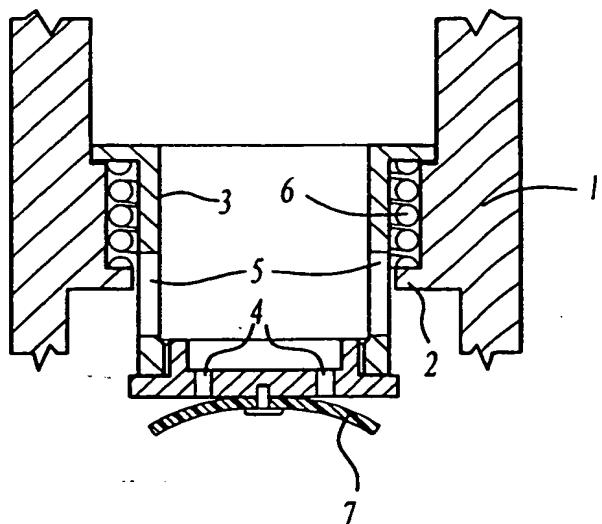


Fig-4

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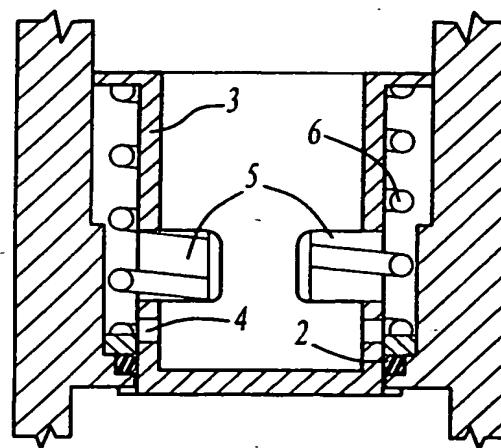


Fig-5

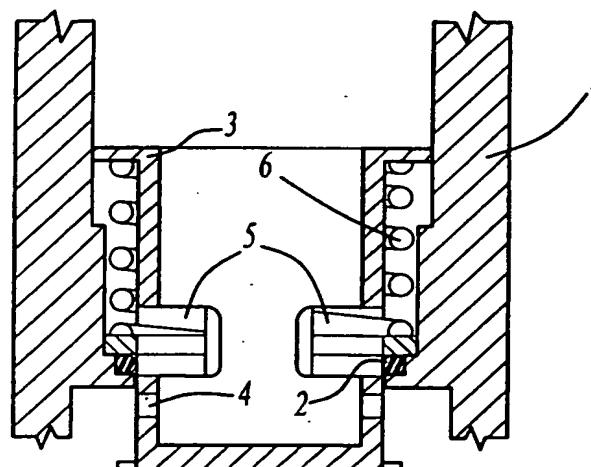


Fig-6

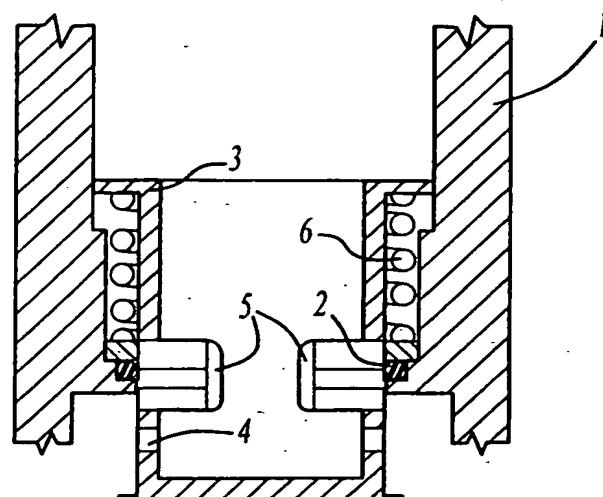


Fig-7

3/4

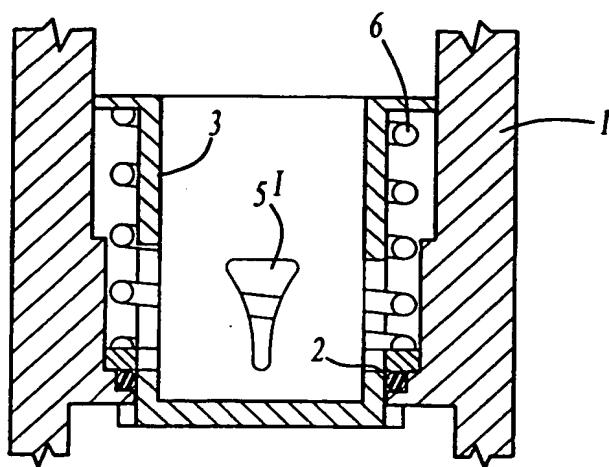


Fig-8

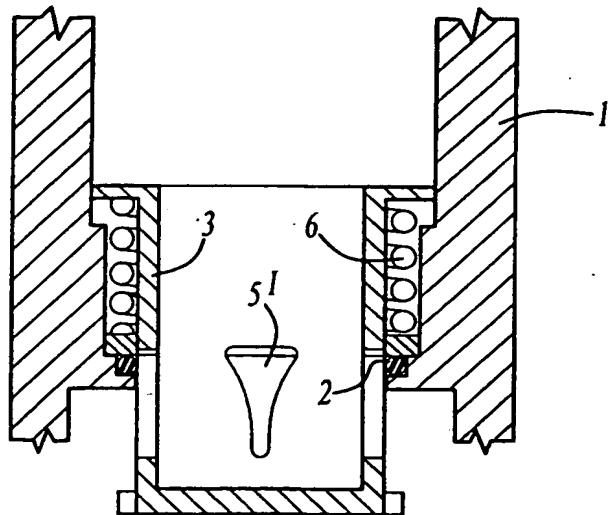


Fig-9

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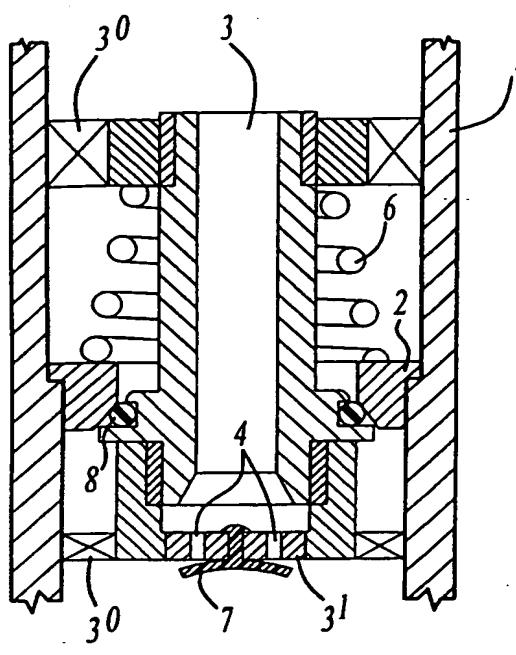


Fig-10

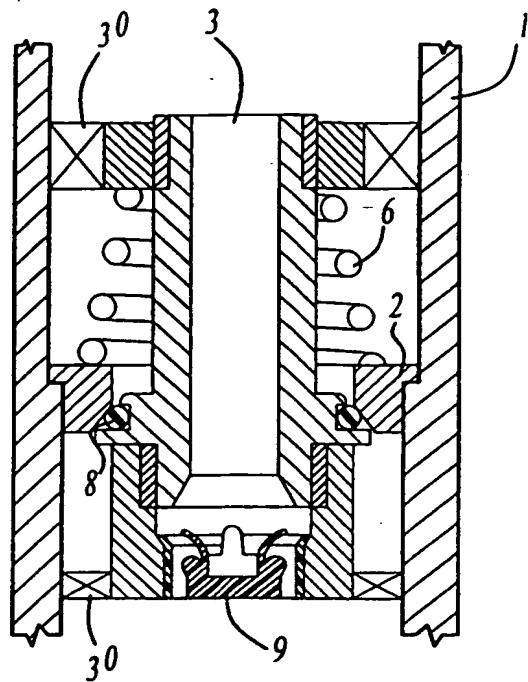


Fig-12

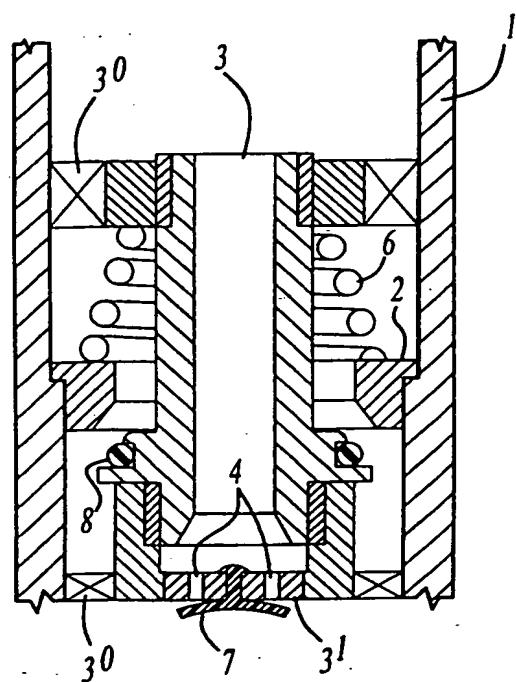


Fig-11

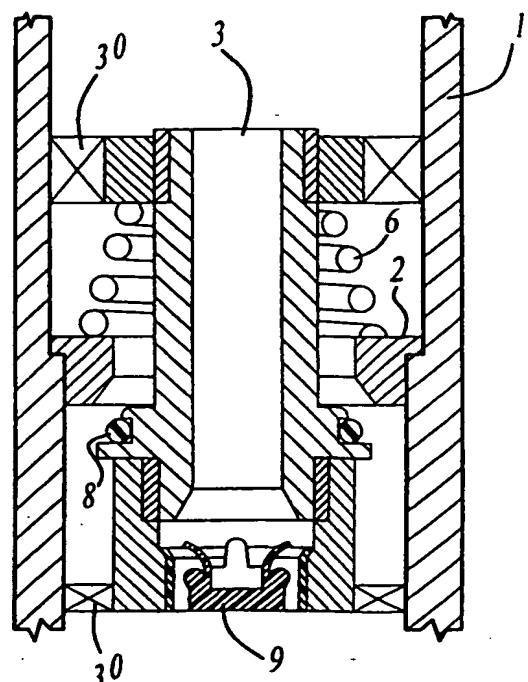


Fig-13

INTERNATIONAL SEARCH REPORT

Internal Application No
PCT/EP 00/07353

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 G05D7/01 F16K15/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G05D F16K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 872 908 C (RICHARD SIMON) 14 August 1952 (1952-08-14)	1,3,5,6
Y	claims 2,3	4,7, 14-17
A	figure 3	2,8-13
Y	DE 89 06 400 U (ROBERT BOSCH GMBH) 20 September 1990 (1990-09-20)	4
A	the whole document	1-3,5-17
Y	WO 99 46652 A (FLOW DESIGN INC) 16 September 1999 (1999-09-16)	7
A	figure 3	1-6,8-17
Y	GB 2 270 139 A (HAUDIQUER IND S A ;DOUGLAS IND SALES LIMITED (GB)) 2 March 1994 (1994-03-02)	14-17
A	the whole document	1-13
		-/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Date of the actual completion of the international search

5 December 2000

Date of mailing of the international search report

14/12/2000

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Philippot, B

INTERNATIONAL SEARCH REPORT

Internal Application No
PCT/EP 00/07353

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	column 3, paragraph 3	10
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